THE RELATION OF THE VERMIFORM APPENDIX TO HERNIA,

WITH CASES AND COMMENTARIES.

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- INTRODUCTION -

For some years I have been much impressed by the importance of diseases in connection with the vermiform appendix. The subject is all the more important because appendicitis is a disease which is essentially one occurring for the most part in early adult life, and many valuable lives are thereby affected. The appendix and its diseases is therefore a subject well worthy the close attention and study of the general medical practitioner. It is he who is first called upon to treat the cases, and it is really upon him that the lives of the patients chiefly depend. He should, therefore, make himself thoroughly acquainted with its multitudinous clinical forms, its simulation by many other diseases, and the various pathological changes which may occur, and which develop sometimes with alarming rapidity.

The whole subject of appendicitis is much too large to come within the scope of a thesis. I had, therefore, a difficulty in deciding what branch of it I should treat of in my paper. In looking through the available literature on appendicitis, which is truly vast and well worthy the importance of the subject,

I was unable to find any complete treatise on the relation of the vermiform appendix to hernia. Hence my reason for selecting this important branch of the Appendix and its diseases as the subject matter of a thesis.

My treatise is based on the experience gained during the last five years in an extensive private, consulting, and hospital practice. During that time I have had over 100 cases of appendicitis under my personal observation and care in hospital and in private practice, and on 90 of these I operated. I have also operated on 99 cases of ordinary herniae, and have done approximately 130 abdominal sections for various conditions, exclusive of appendicitis and hernia.

Although my experience has been a fairly extensive one, yet it is in itself not sufficiently varied to enable me to deal with the relation of the vermiform appendix to hernia in all its bearings. I have, therefore, amplified my own observations by frequent references to the contributions of other writers. From the literature on the subject, especially in the various medical journals, I have been able to collect over 200 examples of hernia of the

appendix. The numbers of recorded cases are therefore sufficiently many to enable me to form definite deductions in regard to the relation of the vermiform appendix to hernia. These deductions I have embodied in my thesis.

In regard to my own series of illustrative cases it will be seen that I have not confined my remarks to the hernial aspect alone, but have also commented on any other features of interest presented by them.

Throughout the paper I have given only as much surgical detail as is necessary to illustrate my points.

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Historically, hernia of the appendix is of interest. According to Deaver, the first authentic reference to the removal of the appendix during life is found in 1735. In that year Claudius Amyand Esq. F.R.S. operated on a boy 11 years of age, for a discharging sinus in the right thigh, which communicated with an irreducible scrotal hernia existing from infancy. In the course of the operation (which is described in full by Deaver in the third edition of his book on the appendix), Mr.Amyand found that the sac contained a portion of the omentum, and the appendix caeci which was perforated by a pin. Faecal matter escaped through the opening made by the pin. The consensus of opinion of the physicians and surgeons present at the operation was that it would be proper to amputate the organ. It was accordingly ligatured and cut off, as was also the herniated piece of omentum, and the sac. The case progressed favourably and recovered, although ultimately a hernia recurred.

There is hardly any reference to hernia of the appendix in the literature until the operation for radical cure became customary. Probably the earliest reference to hernia of the appendix was made by Morgagni in 1751. I have now before me his work on "The seats

and causes of diseases investigated by anatomy" translated from the Latin by Dr.Benjamin Alexander and published in London in three volumes in 1769. In letter XLIII vol.11, Morgagni treats of Hernias. The first case he mentions is that of a man, who, during life, was supposed to have three testicles. A post-mortem examination showed that what seemed to be the third testicle - which lay on the left side - was a herniated portion of omentum. On the right side there was also a tumour. This, on dissection, was found to be the appendix prolapsed into a similar sac. In discussing the cause of the prolapse, he says that it is difficult to conceive how so small an organ came to be there alone. It would be more readily understood, he says, had it fallen down into the scrotum, with the caecum and colon, the ligaments of these structures having become relaxed. He says that it may possibly have entered the sacculus formed by intestinum ileum, after the latter structure had returned to the belly.

Morgagni quotes cases of appendicular herniae on the left side observed by Mauchartus and also by Sesingius, where the hernias were very large, and the appendix accompanied by the caecum and part of the colon and in one case by eight ells of the small intestine. Morgagni goes on to say "these things I take

notice of, that you may know how far the ligaments of the colon may become relaxed in large hernias, so as to suffer this intestine to follow the small ones, when dragging downwards by their weight; and even the appendicula itself to be prolapsed, into the left part of the scrotum, though together with caecum".

It is obvious, therefore, that even so far back as 1751, there were observers fully cognisant of the occurrence of appendicular hernia, and not only on the right side but also on the left.

In the literature of recent years there are numerous references to external hernia of the appendix. In St.Bartholomew's Hospital Reports, vol.xxxii, 1896, McAdam Eccles gives a summary of 29 cases collected from the literature. H.S.Clogg, in The Lancet of 20th Oct.1906, published a paper on strangulation of the appendix within a hernial sac, of which he was able to collect 53 examples from various sources. As an example of the fairly numerous recent references to appendicular herniae, and as some indication of the importance of the subject, it may be stated that, in the British Medical Journal, the following cases appear in the issues of the last six months. On Sept.8th Mr.Billington records a case of left inguinal hernia, the sac of which contained the caecum and appendix. In the issue

of 15th Dec., Mr.Heaton describes two cases; one an inguinal which contained the appendix alone; the other a femoral hernia which consisted of the appendix and a portion of the omentum. Both cases were right-sided. In the number of 2nd Feb. Mr.Chiatale-Bhajeker records a case of left inguinal hernia, the sac of which contained the caecum and appendix. He also mentions two cases of right-sided inguinal hernia in which the sac contained the caecum and appendix. So many cases have now been recorded that certain deductions may be made from them.

In regard to the various retro-peritoneal fossae, it is only of recent years that the significance of these recesses in the pathology of the appendix has been sufficiently recognised and emphasised. Their importance in relation to hernia of the appendix was to some extent recognised by Vosse in 1749 (quoted by Deaver) who says that the appendix may be hidden in one of these behind the caecum. Trietz also in 1857 described the peritoneal fossae. There was, however, no clear exposition of the subject until 1891 when Lockwood and Rolleston published in the Journal of Anatomy and Physiology Vol.xxv their valuable work "On the Fossae round the Caecum, and the Position of the Vermiform Appendix, with special reference to

Retroperitoneal Hernia". In 1897 Berry of Edinburgh also published a most valuable work entitled "The Caecal Folds and Fossae, and the Topographical Anatomy of the Vermiform Appendix".

The Herniae of the Vermiform Appendix, like those of other portions of the abdominal viscera, divide themselves into two main groups, (1) the external and (2) the internal. The relationship of the appendix to ~~external~~ herniae may conveniently be discussed under the following headings:-

(1) The Factors concerned in the production of Hernia of the Appendix.

(II) The Anatomical Sites.

(III) The Condition of the Appendix within the Hernial Sac.

(IV) The Diagnosis.

(V) The Treatment and Prognosis.

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(1) The factors concerned in the production of external hernia of the appendix.

(a) The acquired form.

The normal position of the caecum and appendix is almost entirely within the right iliac region of the abdomen, where they are more or less movable structures. Although the appendix has usually a wide range of movement around its point of origin from the caecum, yet it cannot be brought down to, or pulled into, either the right inguinal or femoral rings. Its pro-

trusion, therefore, into an external sac in either of these sites must be accounted for by some anatomical peculiarity or developmental anomaly. The same factors which tend to produce hernia in general will also favour the formation of appendicular hernia. The following, however, are some etiological factors which especially apply in the production of hernia of the appendix.

Unusual length of the caecum or appendix, or of both, may bring the appendix dangerously near to the abdominal rings on the right side. Given one or more of these anatomical variations and a patent vaginal process, a hernia of the appendix is likely to occur.

In the right iliac fossa, the caecum has usually no proper attachment except where it becomes continuous with the ascending colon. It has, therefore, a considerable range of movement. Any increase in length of the average two inches and a half would bring the appendix within the dangerous zone, and a freely movable caecum would facilitate the hernia of its appendix into an external sac.

A congenital or acquired elongation of the mesentery, or its displacement downwards, may permit of a low position of the caecum and appendix.

Treves(Surgical Applied Anatomy) says that the root of the mesentery, and indeed the whole of peritoneum covering the posterior abdominal wall, may glide a little downwards and constitute a prolapse of the mesentery.

The caecum may also occupy a low position as a result of excess in development. I had an instance of this in a young man on whom I recently operated for acute appendicitis. In a previous attack, the chief symptoms were referred to the urinary bladder. There was great pain on micturition, and increased frequency of the act. Blood had been observed in the urine. The medical man in attendance made a diagnosis of stone in the bladder. At the operation for the second attack I found an acutely inflamed appendix situated entirely within the pelvic cavity, and the caecum lying over the brim of the pelvis. There was a good deal of inflammatory new formation around it, which involved the appendix, the caecum, a small part of the ileum, and the bladder, all these structures being adherent to each other. I look upon this case as an example of the "pelvic position" of the caecum, the result of excess of descent in development.

In large ileal hernias there must be a considerable drag on the mesentery, causing it to be

elongated or displaced downwards. This may ultimately result in the caecum and the appendix being dragged into the sac with the other viscera.

If the appendix should become adherent to omentum, or to peritoneum, it may be dragged with either of these structures into a hernial sac.

There is a great variation in the length of the appendix. I have removed one which was six inches and a half long. Battle & Corner, in their work on the appendix, say that one eleven inches long has been observed. An increase in length of the appendix, with a mesentery which allows free movement will undoubtedly favour the prolapse of the organ, or a portion of it, into a hernial sac.

I think that the presence of a caecum of unusual length or mobility, or one of low position, is a more important factor in the production of appendicular hernia than unusual length and mobility of the appendix.

On the <u>left side</u> the presence of the appendix in a hernial sac is not so readily understood. Here again, an explanation must be looked for in developmental anomalies or anatomical variations such as those mentioned above. Appendicular hernia on the left side is usually found only in children and old people. In

children a frequent cause is some developmental anomaly such as transposition of the viscera. An interesting case of "situs inversus" is recorded by F.E.Larkins, in The Lancet of Feb.2nd 1907. A post-mortem examination revealed a transposition of all the thoracic and abdominal viscera. The caecum with its appendix was situated in the left iliac fossa, and the ascending colon was on the left side.

The caecum and appendix may also be found on the left side owing to failure of development of the transverse colon (Kelly & Hurdon, "The vermiform appendix p.787).

Foerster, quoted by Kelly & Hurdon, claims that deformities such as scolioses and kyphosis may be factors concerned in the production of left-sided appendicular hernia.

Left-sided hernia of the appendix in old people usually occurs in those who are the subjects of large herniae and lax abdominal walls. Elongation and displacement downwards of the mesentery are the chief etiological factors.

The appendix is not infrequently the sole viscus contained within the sac of a right-sided hernia. Should the vaginal process remain patent, the prolapse of the appendix into this congenital sac is readily

enough understood. In many cases, however, it is found alone in a femoral sac, which is not usually believed to be congenital. Wood (Annals on Surgery, May 1906) has been able to collect 100 cases in which the appendix alone occupied the sac of a right femoral hernia. Similarly the appendix has frequently been found alone in the sac of a right inguinal hernia, where the sac did not present the features of a patent vaginal process. The question arises as to how such herniae are produced. In some cases it may enter the sac with other viscera, which subsequently became reduced, the appendix alone remaining within the sac, possible on account of adhesions. The appendix may also enter a sac previously formed and vacated by some other viscus.

McAdam Eccles, in his book on Hernia, raises the question as to whether the appendix alone can be the primary and final contents of a hernial sac. He says that it is undoubtedly possible for it to be extruded into the sac of a congenital inguinal hernia on the right side, but in this case there is a ready-made sac into which it may prolapse. It is more difficult to understand, he says, how so small an organ and one having so small a surface area, would be able of itself to form a sac by pressure. He points out that it does not require a very resistent organ to form

a sac, and he arrives at the conclusion that it is probable that the appendix of itself may form a sac and continue to be the sole occupant thereof. A small elongated portion of omentum is frequently found to be the sole occupant of a sac, and it seems reasonable to suppose that the appendix may likewise form a sac for itself and remain its sole contents.

Some observers, notably R.Hamilton Russell (Lancet Nov.3rd. 1906), believe in the Saccular Theory of hernia. This theory rejects the view that hernia can be "acquired" in the pathological sense, and maintains that the presence of a developmental peritoneal diverticulum or sac is anecessary antecedent condition in every case of abdominal hernia. Russell divides abdominal hernia into three groups - the Saccular, the Traumatic, and the Congenital.

The Saccular group comprises all the ordinary herniae, and the term applies to all those forms of abdominal herniae which result from the descent of some portion of the abdominal viscera into a sac, which is a peritoneal diverticulum of developmental origin.

The Traumatic group includes hernial protrusions the result of injuries to the abdominal wall, and especially after surgical operations.

In the Congenital group he includes all these

herniae which are present at birth, examples of which are those which result from congenital imperfections in the abdominal wall in the middle line, or elsewhere, mostly in the lumbar region as a result of congenital insufficiency of the musculature. He also applies the term to certain cases of saccular hernia which are present at birth, but not to inguinal hernia occurring after birth.

I think there is much to be said in favour of the proposition that "the presence of a peritoneal diverticulum or sac is a necessary antecedent condition in every case of abdominal hernia". I have seen many cases in my own practice in which the relationship of the sac to the contents supported this theory. In some instances, where the sigmoid flexure was protruded into a left inguinal sac, there was an intimate connection between the herniated bowel and the sac, yet it was obvious that this connection was not due to adhesions. The explanation is that the sigmoid flex-ure had been drawn down with the peritoneum to assist in the formation of the funicular process.

This theory also makes it more easily understood why the appendix is frequently found alone in hernial sacs, and especially in a right femoral one. According to this theory, the appendix does not form

the sac, but becomes protruded into a congenital peritoneal diverticulum.

(b) The Congenital form:-

Congenital appendicular hernia is always inguinal, and nearly always occurs in the male sex. By a congenital hernia of the appendix I mean one which is present in the sac at birth. Kelly& Hurdon say that many observers, including Rokitansky, Virchow, Orth and others claim that the peritoneum of the foetus is frequently the seat of a chronic or acute inflammatory process, and the resulting adhesions are often the cause of anomalous positions of the abdominal organs. Ante-natal inflammatory conditions affecting either the appendix or testicle may result in their becoming adherent to each other. Adhesions between these two organs, however produced, would enable the same forces which cause the descent of the testicle also to bring down the appendix into the inguinal canal. It is interesting to note that, in nearly all the recorded cases of congenital appendicular hernia in children, the appendix has been more or less adherent.

There is not much to be said in regard to the production of internal hernia of the appendix. The normal anatomical relationship of the appendix to the peritoneal fossae behind the caecum would permit it to pass into one of these pouches, where it may become fixed. Lockwood has suggested another factor in the

production of this form of hernia. He supposes that, while an ordinary scrotal hernia is being formed, the displacement of the parietal peritoneum causes the appendix to remain behind and become imprisoned in a retro-peritoneal fossa. Mc.Adam Eccles says that during the descent of the caecum in development, the appendix may be left behind and become caught in the sub-caecal fossa. Keith (Human Embryology and Morphology) says that during development the caecum comes to be situated in front of the right kidney, near the gall-bladder, and there it remains until about the time of birth, when both the caecum and ascending colon undergo a gradual migration towards the right iliac fossa. The cause of this migration is not known, but it occurs only in animals adapted to the upright posture. Thus the attachment of the ascending meso-colon is formed by a secondary adhesion to the parietal peritoneum during the migration of the colon and caecum. The appendix during the migration, may be caught behind the colon; it is then lodged and fixed in the ascending meso-colon. A good example of this is described in Case XII of my illustrative series.

(II) The Anatomical Sites.

The appendix may be found in an inguinal or femoral hernia of either side. It is occasionally seen in an umbilical hernia, and one case of obturator hernia (mentioned by Kelly & Hurdon) has been recorded.

It is relatively most commonly seen in a right inguinal or femoral hernia; much less frequently in the same varieties on the left side. In regard to the right-sided forms, most authorities say that the femoral is the most frequent. Others say that the inguinal variety is the commoner. It is probable that the two forms are of about equal frequency, the inguinal variety perhaps preponderating. Wood (Annals of Surgery May 1906) says that appendicular hernia is more frequent that in commonly supposed, and that the appendix is more apt to be found in a right femoral than in a right inguinal hernia. Kelly & Hurdon say that the femoral variety is much the commonest form in women, but that, in all cases, the inguinal form constitutes 70 to 80 per cent., the femoral 20 to 30 per cent., while only a few umbilical, and one obturator has been recorded. The same authorities say that the appendix is present in the sac in about two per cent. of all cases of hernia. Clogg (Lancet Oct.20th 1906) has collected statistics of 3,404 cases of inguinal and femoral hernia, and in

these the appendix was present in the sac 65 times, which is about two per cent. In 100 consecutive cases of radical cure of inguinal hernia in children, he found the appendix present eight times. In my own series of 90 consecutive cases of operation in the usual sites, the appendix was present in the sac five times.

The Internal Herniae of the appendix constitute a most important group. As a result of my own observation and experience I have become much impressed by the surgical and pathological importance of the retro-peritoneal fossae around the caecum in relation to hernia and consequent disease of the appendix. No definite statement can be made as to the relative frequency of retro-peritoneal hernia of the appendix, but my experience leads me to believe that it is by no means uncommon condition. Moynihan, in his book on retro-peritoneal herniae, says that it probably exists in from 8 to 10 per cent. of all cases the subjects of appendicitis, and that possibly this is an under, rather than an over, estimation. In a series of 90 cases of appendicitis operated on by me, the appendix was found herniated into one of these fossae six times. In these cases the herniated condition was clearly seen. In many cases of appendicitis, with abscess or much inflammatory new formation, it is difficult to make

out definitely the anatomical relationships. In some of my cases with abscess formation, although the position of the appendix was recorded as retro-caecal, yet I think that a few of these, in addition to the six above mentioned, might have been correctly classified as retro-peritoneal hernia of the appendix.

These fossae are also of importance in that other portions of the bowel may become herniated and strangulated in them. Moynihan records several cases observed by himself and others. Mansell Moullin (Lancet, April 1st, 1899. p.897) has described a case of strangulation of a portion of the ileum in a post-caecal pouch. In this case a diagnosis of appendicitis was made prior to the operation.

To Lockwood, amongst surgical writers, must be given the credit of first drawing attention to the importance of these fossae in relation to hernia of the appendix. He did so as early as 1890, his paper being published in the Transactions of the Pathological Society, London, vol.xli, p.118. He says that hernia of the appendix may occur into either the sub-caecal or the ileo-caecal fossa, where the hernia may be partial or complete. In some cases the mouth of the fossa may be completely closed, when it would be very difficult to find the appendix. Lockwood makes

the statement that the appendix is never absent except as a result of disease, and that, in most of the cases in which its absence has been assumed, it has probably been hidden away in onw of the fossae around the caecum.

Jonnesco ("Hernies Internes Retro-peritoneales" Paris, 1890) also directs attention to the importance of these fossae in relation to hernia of the appendix. In some cases, he says, when the appendix lies hidden in one of these fossae, it is found only with the greatest difficulty.

The nomenclature used by the various writers in describing the retro-peritoneal fossae varies so much that it is necessary to give a description of them, in order that the references to them in my cases may be understood. The following description is taken from Lockwood and Rolleston's work.

The ileo-colic fossa is a peritoneal pouch situated in front of the mesentery in the angle formed by the junction of the ileum and colon. The floor is formed by the mesentery and sometimes also by a portion of the ileum. The ileo-colic fold of peritoneum forms the upper boundary of the fossa, and sometimes a partial roof. This pouch does not play an important part in appendicitis, on account of its elevated position.

The ileo-caecal fossa is a peritoneal pouch situated behind the junction of the ileum and caecum. To expose it both the ileum and caecum must be elevated. It is bounded on the right by the mesentery of the ascending colon, and on the left by the mesentery proper. The roof is formed by the ileo-colic fold, a bloodless fold of peritoneum which extends from the free border of the ileum to the caecum and finally joins either the surface of the meso-appendix or the under surface of the mesentery near the attachment of the meso-appendix. This fossa may be deep and long, and sometimes reaches half way up the ascending colon beyond the crest of the ileum, and ends close to the duodenum and kidney. An appendicular abscess in this fossa may simulate one in connection with the kidney or a lumbar abscess, or one in connection with the gall bladder, or even an empyaema. It is the most important of the peri-caecal fossae in regard to hernia of the appendix.

The sub-caecal fossa is immediately under the caecum, and this portion of the bowel must be raised in order to view it. It is less constantly present that the other fossae. Its mouth is found behind the junction of the caecum with the colon, and the fossa here separates the meso-colon into two double folds. The appendix is sometimes herniated into this fossa, but not so frequently as into the ileo-caecal

fossa.

(III) The Condition of the Appendix within the Sac of an (A) External Hernia, and (B) Internal Hernia.

(A) External Hernia.

The appendix may be the only occupant of the sac, or it may be accompanied by other portions of the bowel, usually the caecum, or by the omentum.

(a) The appendix alone within the sac.

The appendix has been found alone in the sac of a right inguinal, in a right femoral, and also in left inguinal hernia. It has probable never been found alone in an umbilical or a ventral hernia, and I have not been able to find a recorded instance of its occurrence alone in a left femoral sac.

The appendix may be completely herniated, or only a portion of it may be prolapsed. It usually lies in the sac with its apex as the most advanced point, but it may be curved or bent upon itself, and both the base and apex may lie within the abdomen, the dependent loop being within the sac.

The herniated appendix is liable to be affected by the same pathological changes as those which occur in it when situated within the abdomen, and the same complications may arise in it as in other herniated portions of bowel. If at first reducible it may therefore become irreducible, inflamed, inflamed

and perforated, and strangulated or even gangrenous.

The Irreducibility is practically always due to adhesions. The herniated appendix, if not at first adherent, is likely to become so. The adhesions are due to local inflammation, which is induced either by injury (by a truss for example), or by defective drainage. When an appendix becomes adherent, kinking or angulation is likely to occur, and drainage is in this way interfered with. The appendix may be adherent only by the tip, or it may be attached only to the mouth of sac. Sometimes it is found to be adherent by its whole length to the sac.

The mouth of the sac may be completely blocked by the adherent appendix, and a hydrocele of the hernial sac produced. An interesting case of this kind is recorded in The Lancet of Feb.13th 1904, p.432,. In this case an operation showed that the sac containing the fluid was the distal portion of a peritoneal diverticulum through the right inguinal canal the proximal portion of which contained the appendix. The diverticulum was much narrowed at the external abdominal ring, where the apex of the appendix was adherent to the walls of the sac.

Elongation of an adherent and herniated appendix may occur.

Cystic distension, due to obstruction of the lumen, may occur in a herniated appendix, just as it does in an intra-abdominal one.

Inflammation of a herniated appendix is very common. The same factors which cause inflammation in a normally placed appendix will also induce it in a herniated one. The exposed position of the herniated appendix, and the great likelihood of its drainage becoming interfered with, makes it liable to injury and bacterial invasion, and consequently to inflammatory attacks.

A concretion may form within a herniated appendix, and inflammation may lead to perforation, just as it frequently does in one normally situated. An interesting case of perforation of an inflamed appendix within a hernial sac is described in my series of illustrative cases.

Foreign bodies are sometimes found in a herniated appendix. As already mentioned, a pin was found in one removed by Mr.Amyand in 1735. Lockwood (Appendicitis, its pathology and surgery p.99) found six or seven shot in an appendix in the sac of an inguinal hernia. McAdam Eccles quotes two cases of herniated appendices in each of which a piece of bone was found.

Strangulation of a herniated appendix some-

times occurs. If the appendix is present with other viscera in the sac it may easily become strangulated along with them. When present alone in the sac, the strangulation of so small an organ is not so readily understood. It is an interesting fact, however, that in nearly all the recorded cases of strangulation of the appendix, it was found to be the only occupant of the sac. Strangulation may occur in two ways:-

1. By the constriction of the tissues around the neck of the sac. When the appendix is present alone in the sac, the latter is usually a small one with a narrow neck. A large meso-appendix would favour strangulation. These cases are instances of true strangulation.

2. The herniated appendix may become inflamed. The swollen and thickened organ becomes constricted at the neck of the sac by the presence of the rigid structures forming the ring, and strangulation occurs as a secondary result.

This is not true strangulation, but is primarily an inflammation of the appendix, and should be classed as such. It is probable that many recorded cases of strangulation belong to this group. They should be classified, not as examples of strangulation, but as instances of inflammation of the appendix within a hernial sac. It is very difficult in these cases,

except in the early stages, to differentiate by inspection between an inflamed appendix and a strangulated one, because the appearances presented by the diseased organ in the later stages is much the same in the two conditions.

(b) The appendix accompanied by other viscera within the sac.

These cases may conveniently be divided into two groups:-

1. When the appendix merely passes with the caecum into the hernial sac, as in one of my illustrative cases.

2. When the appendix is associated in the sac with a small bowel or omentum. In these cases the appendix is usually adherent.

(B) Internal Herniae.

It is not necessary to say much in respect to the condition of an appendix which has been herniated into one of the internal peritoneal pouches. Practically the same changes may occur in it as those described under external hernia. I may, however, again refer to the important fact that the appendix, when herniated into one of these fossae, may become so fixed in it, and covered and smoothed over by inflammatory products, that it is found only with the greatest

difficulty. I think that most operators, who are accustomed dealing with a moderate number of cases of appendicitis, will have met with such cases.

(IV) Diagnosis.

The diagnosis of appendicular hernia is rarely made before operation. If the possibility of its presence in an external hernial sac were more generally recognised, a correct diagnosis would be more frequently made before operation.

It has sometimes been mistaken for an encysted hydrocele of the cord. An instance of this is given in The Lancet of Jan.30th, 1904, p.296.

When the herniated appendix is inflamed or strangulated, the resulting symptoms may be almost identical with those arising from intra-abdominal appendicitis. They also closely simulate those produced by a Richter's or a Littre's hernia, or by an incarcerated omental hernia, or by a strangulated ovary, all of which conditions give rise to symptoms of incomplete obstruction.

The most important condition for which it is liable to be mistaken is intestinal obstruction from a strangulated portion of bowel in a hernial sac. In both conditions there is a sudden onset of the illness, with localised pain, swelling, tenderness, and rigidity. Vomiting and constipation may be present in both, but in purely appendicular conditions the vomiting is not so urgent or persistent and it does not

become stercoraceous. Moreover, the constipation is not so absolute. Abdominal distension and generalised pain are more marked in obstruction, and the patient is more collapsed. In appendicitis the temperature is usually raised, while in intestinal obstruction it is usually subnormal. The differential diagnosis is frequently impossible and can only be cleared up by an operation.

The diagnosis of an internal hernia of the appendix into one of the peri-caecal fossae cannot certainly be made before operation. I have noticed, however, that in those cases in which I have found, at operation, the appendix herniated into one of these fossae, symptoms referred to the right hip-joint were usually well-marked and formed a prominent feature of the cases. There was usually marked flexion of the hip joint, with pain on attempting to extend it. In one of my series of illustrative cases, the hip joint could not be got into the fully extended position until some weeks after the operation, and extension by weights had to be applied. Indeed, for some weeks, the possibility of coincident hip-joint disease could not be absolutely excluded. Full movement at the hip joint ultimately resulted, although the patient was lame for some time after her discharge from the Infirmary.

Frequently also in these retro-caecal positions of the diseased appendix, there is pain referred to the region of the hip joint. It is in these cases that hip joint trouble is simulated and not infrequently diagnosed, especially in children. H.V.Gibney in 1881 ("Perityphlitis in children, illustrating points in the differential diagnosis of hip disease" Amer.Journ.Med.Sci. 1881. N.S., vol.81, p.119) first called attention to the danger of mistaking chronic appendicitis for hip disease. Such an error, in uncertain cases, has been made by medical men of good reputation.

The reason why symptoms referred to the right hip joint should be especially prominent in cases of appendicitis where the appendix occupies a retro-caecal position is on account of the intimate relationship which a diseased appendix in this position bears to the psoas muscle and to the nerves which supply the hip joint. I think the point is of some clinical importance as a guide to the position of the diseased organ.

(V) The Treatment and Prognosis.

Whenever an external hernia of the appendix has been determined, the ideal treatment is its removal, and in every case, whether the organ is to be removed or not, an operation should be advised, because a herniated appendix should not be allowed to remain herniated.

If not already diseased it is extremely likely to become so, and is an ever-present source of danger to the patient.

The method of treatment for the relief of a herniated appendix may vary according to the condition in which it is found. If, at an operation for radical cure of a hernia, the appendix is found within the sac, it may either be returned into the abdomen, or it may be removed. It is justifiable to reutrn it, if there are no adhesions of the viscera within the sac, and if the appendix looks and feels perfectly normal. Even under these circumstances I think it is safer to remove the appendix, because it is impossible to determine, from an external examination, whether it is or not in a quite healthy condition. Frequently it happens that an appendix which appears healthy so far as an external examination is concerned,

is seen to be diseased when the lumen is exposed, or when it is examined microscopically, When no adhesions are present, the appendix, is, as a rule, easily removed, no difficulty being usually experienced in bringing the caecum down into the wound, if it is not already within the sac.

When adhesions are present within the sac the appendix should always be removed.

In cases of inflammation or strangulation of the herniated appendix, or when abscess has arisen in connection with it, amputation of the diseased organ should always be attempted. The utmost care should be taken to prevent contamination of the general abdominal cavity. In these infective cases, the wound should be left open, and the davity drained.

The Prognosis is good in the non-inflammatory cases. The removal of the appendix does not seem to disturb the patient in any way, and convalescence after the radical cure goes on satisfactorily.

In the inflammatory cases the prognosis is as good, as it is in the intra-abdominal ones. Occasionally, when the appendix has not be removed, an intestinal fistula follows. This either spontaneously closes, or does so after an operation.

The prognosis in the cases of true strangu-

lation is better than in the inflammatory. A strangulated appendix has occasionally been returned into the abdomen without apparently any harmful after results.

Occasionally death occurs from general peritonitis, due to infection of the peritoneum from the hernial sac, or it may be produced by a diseased appendix which has been reduced into the abdomen.

The relation of the appendix to internal hernia and consequent strangulation of other portions of the intestine.

Reference may conveniently be made here to the part which the appendix plays in the causation of internal hernia and consequent strangulation of parts of the intestine other than that of the appendix. The appendix may be the cause of obstruction if it is of undue length and supplied with a long mesentery, and if, at the same time, it is attached by its free extremity to some other point by adhesive inflammation. Adhesion of the appendix to some other structure may be due either to inflammation originating within the appendix, or to inflammation of the structure to which it becomes adherent. A loop may thus be formed through which some portion of the bowel may pass and become strangulated. In my series of abdominal sections done for appendicitis and various other conditions, I have seen the appendix adherent to the mesentery of the ileum, to the ileum itself, to the right ovary, and to the uterus, in each of which cases a loop formed through which a portion of bowel might have become herniated.

Cases have also been recorded of hernia of a portion of bowel through a hole of the meso-appendix.

Hernia of portions of the bowel, other than the appendix, into one or other of the peri-caecal fossae have frequently been recorded, and in some of these a diagnosis of appendicitis was made.

I think this subject may be best illustrated by citing a series of selected cases. One of these occurred in my own practice; the others have been recorded by other observers.

N.L., a girl aged 12 years, was admitted to Chichester Infirmary, under my care, on March 19th, 1905, suffering from intestinal obstruction. At the operation I found a few inches of the lower end of the ileum strangulated by a band formed by a a long appendix which was adherent by its tip to a tuberculous gland situated within the mesentery of the ileum. The appendix had thus formed a loop through which a part of the ileum had become herniated. This diseased gland was as big as a hen's egg, and there was a second gland near it as big as a walnut. These swellings, when opened into, were found to consist of a calcareous shell containing pultaceous caseated material. The appendix was freed, and the bowel released. The caseated glands were also removed. The patient did very well until about the fourteenth day after the operation when she again developed signs of intestinal obstruction.

A second laparotomy was performed, when the obstruction was found to be due to adjacent coils of bowel being adherent to each other. The coils were separated and the abdomen closed. The patient made an uninterrupted recovery, and 18 months after the operation she was a strong robust girl.

In many of my cases of internal strangulation of the bowel by bands I have found evidence of glandular tuberculosis.

H.S.Nennet (Lancet, Oct.20th, 1906) records a case of acute obstruction of the bowel caused by the appendix which completely encircled a portion of small bowel, the distal end being adherent to the posterior abdominal wall close to the caecum and beneath that portion of gut which it was constricting. A pin was found within the lumen of the appendix.

Rudaux and Chartier (Brit.Med.Jour. Epit. July 15th 1905.) records a case of strangulation of the bowel by an adherent appendix in a pregnant woman: The patient died, and a necropsy disclosed widely diffused peritonitis, and a coil of intestine, the last few inches of the ileum, was seen to be strangulated by a band, consisting of the appendix which encircled the intestine, and was fixed by an adhesion to the mesentery just at the point where it

was continued downwards into the meso-appendix.

Professor Sutherland (Brit.Med.Jour. June 4th 1904, p.1310) records a case of intestinal obstruction in a woman aged 28 years. In the right iliac region a loop of bowel was found to be snared under the vermiform appendix, which was firmly adherent by its free end to the mesentery close to the ileum, and about three inches from the lower end of the latter. There was no sign of recent inflammation of the appendix.

G.Lovell Gulland, and David Wallace (Brit.Med.Jour., Jan.10th, 1903) record a case of constriction of the small intestine by a gangrenous appendix. At the operation it was found that the appendix, which was three inches and a half long, was gangrenous in all but the proximal half inch of its length. It had been twisted on itself so that half an inch from its base it was very thin and its lumen was completely obliterated. It was firmly adherent by its tip to the mesentery close to its attachment, and through the loop thus formed a loop of small intestine, ten and a half inches long, and close to the ileo-caecal valve had passed.

G.Grey Turner (Brit.Med.Jour.,Dec.15th 1906 p.1698) cites a case of obstruction produced

by the appendix but without appendicitis. The patient had been operated on for ruptured ectopic gestation. On the 11th day she died of acute intestinal obstruction. At the necropsy the appendix was found adherent to the stump of the left ovary. The appendix itself showed no signs of disease.

The following cases are quoted by Kelynack in his book on The Pathology of the Vermiform Appendix:-

Marshall (Lancet, 1847, I, p.42) in 1846, recorded a case of strangulation of a portion of the ileum in a woman of 24, from a band passing from the appendix caeci, about its middle, to a separate part of the ileum superiorly.

Little (Lancet, 1847, II, p.389) in 1847, published a case where intestinal obstruction resulted from an encircling of the ileum by an adherent appendix.

Ridson Bennet (Trans.Path.Soc.Lond. IV., 1852, p.246.) mentions a case where, in a woman of 46, the extremity of the appendix was adherent to a cystic tumour of the right ovary. The appendix formed a loop around the ileum and commencement of the ascending colon, cutting it off, to a certain extent, from the remainder of the intestines.

Lincoln (Amer.Jour.Med.Sci., 1853, p.364) in 1853, met with a case of strangulation of the ileum consequent on adhesion of the appendix to the mesentery.

Andrews (Amer.Jour.Me.Sci., 1867, I., 149.) has also recorded an interesting case where intestinal obstruction was caused by "an adhesion formed between the end of the vermiform appendix, which was twisted back and to the left, and a loop of the ileum". This adhesion, 1/3 inch thick and ½ inch long,bridged the ileum 4 inches above the valve, so as to compress it against the spinal column, and completely occlude it.

Hendricks (Med.Record, Nov.18, 1876, p.764) reports a case of intestinal obstruction where the appendix was drawn across the bowel at the junction of the ileum and caecum, and attached to the posterior wall of the abdomen, a little to the right of the spine, forming a loop about six inches in circumference. Through this loop about 18 inches of small intestine was crowded.

Kelynack also records a case observed by himself. The subject was a young boy aged ten. He died with the characteristic symptoms of intestinal obstruction. A small peritoneal band, 4 inches long passed from the mesentery of the appendix to

the mesentery of the ileum, completely constricting the ileum where it crossed it at a point 2 inches above the ileo-caecal junction.

The following two cases, also quoted by Kelynack, illustrate the occurrence of strangulation of the bowel in consequence of its having become herniated through a hole in the meso-appendix.

Partridge (Trans.Path.Soc.Lond., 1860 - 61, XII, p.110) in 1861 showed a preparation at the London Pathological Society where a knuckle of the ileum, immediately above its termination, was found strangulated and much congested, in consequence of having passed through and become impacted in a hole or interspace in the mesentery of the appendix vermiformis.

Dr.Little (Dublin Quar.Jour.LII., 1871, p.237.) in 1871, brought a specimen before the Dublin Pathological Society in which strangulation of the ileum occurred through an aperture in a peritoneal fold of the appendix, which he speaks of as the "ileo-caecal omentum".

In regard to the simulation of appendicitis by a hernia of a portion of the bowel other than the appendix into one of the peri-caecal fossae, I shall cite only one case which was recorded by

Mansell Moullin in The Lancet, April 1st, 1899. The patient, a man aged 40 years, had all the symptoms and signs of acute appendicitis, and there was a history of his having had four previous attacks of a similar character. It was found that a loop of ileum had become herniated into a post-caecal pouch, where it was strangulated. A diagnosis of appendicitis was made in this case before the operation.

The following case, recorded by R.W. Lemming and Mitchell Innes Dick, in the Brit.Med. Jour. of February, 1906 p.379, is an interesting one in that it shows how an appendix may be herniated into a hole in the mesentery of the small intestine to form a constricting band which causes intestinal obstruction.

The patient, a boy aged four and a half years, had symptoms of intestinal obstruction. It was found that the obstruction was due to the appendix, which was upwards of six inches long. It passed across the small intestine, on the opposite side of which its swollen end was seen to have passed through a hole in the mesentery. The bulbous extremity of the diseased appendix had prevented its return from the hole.

The following case of intestinal strangulation is a most interesting one, and is, I imagine almost unique. I am indebted to Dr.Kidd, the Medical Superintendent of the West Sussex County Asylum, for the following particulars in regard to the case, for an opportunity of examining the specimen, and for the accompanying photographs illustrative of the parts involved in the hernia.

The patient, a married woman, aged 49 years, was admitted into the West Sussex County Asylum on June 25th 1901, suffering from chronic mania. She was quiet as a rule, but had fixed delusions. On January 13th, 1904, she became ill with influenza, which was then epidemic in the institution. The symptoms were chiefly of the gastric type, with vomiting, slight pyrexia, muscular pains, and headache. She was better on the 16th, and took her food well. On the 17th there was slight abdominal pain and distendsion, which increased during the day. She was able to retain the greater portion of her food, though slightly sick in the evening. On the 18th the tympanities became greater and she vomited all her food. The vomited matter was not faecal in character. She died on the afternoon of the 19th.

A post-mortem examination revealed a

most unusual condition in the right iliac fossa. A volvulus had been formed by the terminal part of the small intestine, and through the loop thus formed the whole of the caecum and its appendix had passed.

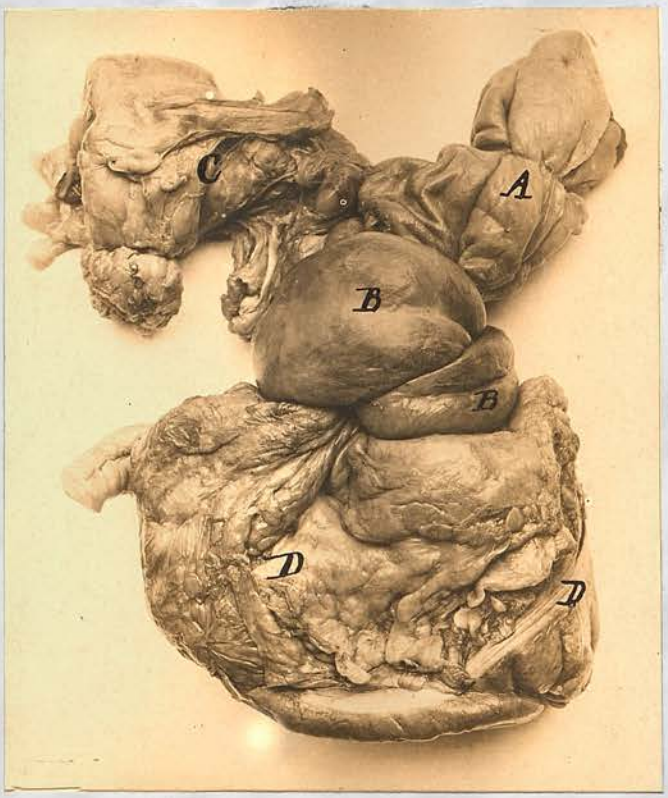
It is difficult to understand how this extraordinary condition could have been produced. Having carefully examined the specimen, I suggest the following explanation. The last few inches of the ileum had formed a half turn on itself. Through the loop thus formed, the caecum, with its appendix, had passed. To make this possible there must either have been a hole in the mesentery of that part of the ileum forming the loop, or the caecum pushed the mesentery of the ileum in front of it and formed a sac for itself. There was, however, no sign of any covering to the herniated caecum and appendix, consequently I think it must be assumed there was a hole in the mesentery. In no other way could the condition be produced.

The tight constricting band formed by the lower portion of the ileum completely occluded the lumen of the ileum immediately proximal to the ile-caecal junction, and also that of the beginning of the right colon.

The appendix was five inches in length, and looked healthy. There were no signs of adhesive

inflammation, therefore the hernia must have been of recent formation.

Figure I.



Anterior view, showing the herniated caecum with constriction formed by a knot consisting of the ileum.

A, indicates the ileum above the constriction.

B, the terminal portion of the ileum forming the knot.

C, the ascending colon.

D, the herniated and strangulated caecum.

Figure II.

Posterior view, showing the herniated caecum, with its appendix, and the constricting band formed by the ileum.

A, the ileum above the constriction.

B, the terminal portion of the ileum forming the constricting band.

C, the ascending colon.

D, the herniated and strangulated caecum.

E, the appendix vermiformis.

A Series of five Cases, from my own Practice,

to illustrate some Points alluded to in the Paper

Concerning

EXTERNAL HERNIA

of the

V E R M I F O R M A P P E N D I X

with Commentaries.

Case.1:-

Perforation of the appendix within a hernial sac.

E.N. aged 71 years, an agricultural labourer, was admitted to the Chichester Infirmary on the 7th of November 1905. He gave a history of having had a hernia on both sides for many years, but had always been able to reduce them, and seemed to have suffered no great inconvenience from either of them until the 1st of November when he was suddenly seized, in the night with pain in the site of the right-sided hernia. Vomiting occurred soon after, and this was frequently repeated on the following day. In the evening, the vomiting ceased but the pain continued. There was a daily natural evacutation of the bowels. When see by his medical attendant, he was advised to be taken to Chichester Infirmary.

I saw the old man shortly after his admission to the Infirmary. There was a large left-sided scrotal hernia, which was reducible. On the right side there was a very tense painful swelling, about the size of an orange, in the inguinal region. The skin over it was slightly oedmatous. There was no general abdominal distension. The radial arteries were much thickened, his pulse was very irregular and intermit-

tent, cardiac bruits were heard, and there were other evidences of old-standing organic heart disease. He had double senile cataract, and in every respect the man looked older than his years. His temperature was 100° F. there was a copious evacuation of the bowels after the administration of an enema.

The patient was operated on shortly after his admission to the Infirmary. The hernial saw was found to be greatly thickened and adherent posteriorly to subjacent structures, from which it was with difficulty separated. Its contents were the ileo-caecal junction, the caecum, and the appendix, which were all more or less adherent to the sac. The appendix was found on the posterior aspect of the sac, in a small abscess cavity behind the caecum. It was much inflamed, thickened, dark purple in colour, and had a small perforation through which, on manipulation, fluid faecal-like material escaped, and also a small concretion. A portion of the caecum adjacent to the appendix was inflamed, dark in colour, and unhealthy looking. During the manipulation, this part of the caecum gave way, and an opening into it thus produced. The internal abdominal ring was large, the bowel was firnly united to the structure composing the internal abdominal ring. The herniated bowel was not strangulated.

By the opening inadvertently made into the caecum an artificial anus was produced, and it was one too, in connection with which there was no risk of contamination of the general abdominal cavity, owing to adhesions at the internal abdominal ring. Taking into consideration the age of the patient, and his general enfeebled condition, I concluded that this condition of artificial anus gave the patient the best chance of recovery, and that no further operative procedure was advisable, after removal of the diseased appendix. This structure was accordingly removed, a Paul's tube tied into the bowel, and the skin incisions partially closed.

The after history of the case is of sufficient interest to be related here. I shall do so briefly and without entering into surgical detail. He rallied well after the operation and was soon out of danger. After the operation, all the faecal matter continued to be discharged through the artificial anus. Although this opening was a good one, and gave comparatively little trouble to the patient, yet he was by no means satisfied with this condition of matters, and was very anxious to have the normal course of the faecal matter restored. In view of his advanced age, the

presence of organic heart disease, and the fact that nothing less than complete resection of the bowel would be of any avail, I at first declined to interfere. The patient, however, continued to improve, cardiac compensation became well established, and the skin round the artificial anus being healthy, I ultimately decided to do an operation for closure of the artificial opening. This was done on February 15th 1906, a little over three months after the first operation. I completely excised a portion of the bowel, and united the ileum to the colon by end-to-end anastomosis. The incision in the abdominal wall was closed up, and healing took place by first intention. The patient was discharged quite well on the 26th of March, i.e. 5 weeks after the operation. I have recently seen the patient, who remains quite well.

REMARKS:-

There are many points of interest in this case. In the first place, appendicitis is an extremely rare in advanced life. The reason for the relative exemption in old people is probably chiefly due to the atrophy of the appendicular lymphatic tissue, which begins at about the 30th year. Deaver, in 3000 operations for appendicitis, had only four cases over 71 years of age. Cuthbert Wallace and Percy Sargent

analysed 1,075 cases suffering from appendicitis and admitted to St.Thomas' Hospital during the 10 years prior to December 1903. Of these only nine were over 60 years of age. These figures are sufficient to show that appendicitis is infrequent in advanced life, and is exceedingly rare in subjects over 70 years old. In my case, however, the disease occurred in a herniated appendix, which, therefore, was more likely to injury and defective drainage, with consequent accumulations and their attendant troubles.

The case is also a good example of the acquired form of appendicular hernia occurring in an old man with old standing large herniae and lax abdominal walls. There was obviously some general enteroptosis, which allowed part of the bowel to be prolapsed through the weak parts of the abdominal walls at the inguinal rings on both sides.

Instances of inflammation and strangulation of herniated appendices have not infrequently been regarded, but almost invariably the appendix alone occupied the hernial sac. The case just described of as inflamed and perforated appendix accompanied by other viscera in a hernial sac is, therefore, rare, and very few cases have been recorded. I have not been

able to find a record of one occurring in a patient of so advanced an age. In the British Medical Journal of June 28th 1902, Mr.Basil Hall, of Bradford, records a similar case in a patient aged 23 years. He there gives a list of eight recorded cases of a perforated appendix within a hernial sac, (one by Professor Annandale published in The Lancet Vol.i.1889), and Mr.Hall believes that, at that time, the list was a complete one of all published cases. Amongst the eight cases, his was the only one in which the appendix was accompanied by other viscera in the sac. There is an additional similarity between his case and mine in that in both a resection of the caecum and ileo-cecal junction was done.

The case is also an interesting one as showing the amount of operative interference an old and enfeebled patient may successfully withstand with comparatively little constitutional disturbance. What, therefore, may have been the factors which, in this case, contributed to a successful result, and which may guide one in the treatment of other analagous cases? In every case of illness, whether of a medical or a surgical nature, the psychical element plays an important part. This patient was of a very phlegmatic and placid temperament, and not only had he no fear of an

operation but expressly desired that the second one should be done. To show the equanimity with which he viewed operations, I may say that, before leaving the Infirmary, he even requested that his cataract should be operated on.

Again, the physical development of a patient is of some importance. In spare subjects, provided the spareness is not due to emaciation, the prognosis after operation is more favourable than in a stout one. The patient under discussion, was one of the lean kind.

The more obvious factors contributing towards a successful result in such cases, such as shortness of time occupied in performing the operation, need not be discussed in this paper.

The diagnosis of an inflamed appendix in a hernial sac is rarely made before operation. It would have been a probable one in this case. The history and symptoms were fairly indicative of acute suppurative appendicitis. There was the sudden onset quickly followed by vomiting, cessation of the vomiting within 24 hours, but a continuance of the pain, and the appearance after a few days of local signs of suppuration: The cessation of vomiting, the daily natural evacuation of the bowels, and the absence of general abdominal distension, negatived a strangulated hernia,

which one would naturally first think of in a case of this kind.

Case II:-

Irreducible right inguinal hernia.

Inflamed omentum and appendix within the sac.

G.F., aged 42 years, a railway guard, was admitted to Chichester Infirmary on March 13th, 1906, suffering from a right-sided, painful inguinal hernia. The hernia was of about six years duration, but he had always been able to return it until the morning of the 13th of March when the hernial swelling suddenly became painful, and the patient found he could not reduce it. He felt sick, but did not vomit.

When the patient was examined after his admission to the Infirmary, a swelling was seen in the right inguinal region. It was tense and painful to the touch, and could not be reduced. There was no impulse on coughing, and the percussion note was dull. The temperature was 99° F. and the pulse 88. The general aspect and condition of the patient were good. A diagnosis of an inflamed and irreducible inguinal hernia was made.

I operated on the patient on the day of his admission to The Infirmary. The sac was found to contain a small amount of turbid looking fluid, and also the appendix, which was slightly adherent near the mouth of the sac. A portion of omentum also

protruded through the mouth of the sac to which it was adherent. The adherent omentum was freed, ligatured, and removed. The appendix was then amputated at its base, no difficulty being experienced in bringing down the caecum to the wound. The radical operation for hernia was then completed in the usual way. The patient made a good recovery, and there was no more constitutional disturbance than is usual after an ordinary operation for radical cure of hernia.

On examination of the appendix, I found its walls hardened and thicker than normal. The lumen contained a small quantity of dark, fluid material, apparently accumulated as a result of defective drainage. The lining mucous membrane was dark in colour, and congested. There was a slight constriction of the lumen where it had been in relationship to the mouth of the sac. The appendix presented the appearances found in mild forms of inflammation.

REMARKS:-

This is an example of a right inguinal hernia of the appendix, associated in the sac with a small portion of the omentum. The latter structure formed a sort of plug to the internal ring, and effectually prevented more of the internal viscera coming down.

The condition of the appendix is interesting. It was obviously in a mildly inflamed condition, so that the patient was really suffering from an attack of appendicitis within the hernial sac. If the operation had been delayed, the condition would probably have resulted in a severe attack.

The exposed position of the herniated appendix rendered it liable to injury. There was also some constriction of its lumen produced by the rigid structure composing the internal ring, and by angulation of the appendix at the same place. Its drainage, and probably also its blood supply, would, therefore, be interfered with. All, or any, of these factors open the way to bacterial invasion, and consequent inflammation. It is not surprising, therefore, that the patient had an attack of appendicitis. It is interesting to note that the symptoms in this case were such as are usually produced by a mild inflammation of a normally situated appendix.

Case. III:-

Congenital Right Inguinal Appendicular Hernia.

An adherent appendix, and a portion of omentum within the sac.

A.G.B., aged 16 months, was admitted to Chichester Infirmary on the 22nd of May, 1906, with a view to operation for hernia. The mother said that the rupture was first noticed about two weeks after the birth of the child, but it might have been present at birth without her seeing it. A truss was immediately procured for the baby, but its use was discontinued after a few days, because, the mother said, it hurt the child, and made it very fretful.

The boy, when admitted to The Infirmary, presented a somewhat ill-nourished appearance. There was a small swelling in the right inguinal region, which could not be reduced.

At the operation, the sac was found to be of the congenital type. It contained the appendix, which was four inches in length. The tip was free, and it was the most advanced part of the appendix as it lay within the sac. The appendix was slightly adherent to the sac near the internal ring. A small

portion of omentum protruded through the mouth, but it did not extend into the body of the sac. It also was slightly adherent to the peritoneum lining the internal ring. The adherent omentum was freed and returned within the abdomen. The appendix was then removed, no difficulty being experienced in pulling the caecum down to the wound. The operation for radical cure was completed in the usual way. The child made an uneventful recovery, and is now (eleven months after the operation) a strong, well-developed child.

The excised appendix presented a healthy appearance to the naked eye.

REMARKS:-

This case may be taken as a type of congenital inguinal hernia of the appendix. It was adherent to the sac, which is almost invariably the condition of the congenital herniated appendix. I think it may be assumed that it was in the hernial sac when the child was born, although the mother did not notice it until about a fortnight after its birth. The adherence of a small point of omentum to the mouth of the sac was probably of post-natal occurrence.

I think this case illustrates the advisability of operation in all cases of hernia in children

which cannot be controlled by a truss. I find that quite young infants stand the operation for radical cure well, and the results are very satisfactory.

Case IV:-

Congenital Umbilical hernia.

Caecum and Appendix within the Sac.

B., a baby aged about 36 hours, was admitted to Chichester Infirmary on the 11th of July, 1904 suffering from a hernia of the umbilical cord. The Child was poorly developed, but no other malformation than that of the abdomen was present. The temperature was 99.4, pulse about 150, and the respirations 62. The patient looked ill. In the umbilical region there was a round tumour, about the size of a tangerine orange. At the basal, or proximal end of the tumour, the skin of the abdomen was sharply defined from the coverings of the hernia. These coverings, which consisted of the distended funicular tissue, were in a condition of septic necrosis. At the distal end, they were continuous with the ligated umbilical cord. The outline of the contained bowel could be recognised through the thin and distended coverings of the sac. The protruding structures were obviously in an inflamed condition, and adherent to the coverings. An operation held out the only hope of preventing death from septic peritonitis. The child was anaesthetised, an incision made around the cutaneous margin of the swelling, and the hernial sac and its coverings removed.

The contents of the sac were a part of the ileum, and the caecum with its appendix. These structures were in an inflamed condition, and slightly adherent to each other. The adherent coils of bowel were separated from each other, cleansed, and placed within the abdomen. The abdominal wound was closed by a few sutures. The child died on the following day.

REMARKS:-

This may be taken as a fairly typical example of congenital hernia of the umbilical cord. The caecum and appendix are not infrequently found within these herniae, but the appendix is never found alone in the sac. The viscera in this case were all in an inflamed condition, the appendix being distinctly affected. It was an inflammation which began, not in the interior of the appendix, but in the peritoneal covering of the contained viscera. In other words, the condition was due to septic peritonitis.

If the term HERNIA be restricted to a condition in which there is a protrusion of a viscus from its natural cavity, then, strictly speaking, the Congenital Herniae of the Umbilical Cord should not be classified with the herniae but with the malformations, since the viscera are not abnormally protruded.

They have failed to become withdrawn into the abdominal cavity, and continue to lie in front of its wall, owing to non-closure of the abdominal wall. It is a condition of Ectopia rather than of Hernia.

Case V:-

Ventral Hernia. Caecum and Appendix within the Sac.

E.J.G., a Grocer aged 50 years, was admitted to the Chichester Infirmary on Dec.19th, 1905, suffering from a ventral hernia. The following information in regard to the previous history of the case I obtained from Mr.A.H.Bostock, his medical attendant, with whom I saw the patient in consultation before he was admitted to The Infirmary. In June 1904 he had an acute attack of appendicitis with the formation of a large abscess. This was opened and drained, and no attempt was made to remove the appendix, which was neither seen nor felt at the operation. A day or two after the operation, a slough came away with the discharge. This was thought to be the necrosed appendix. A few weeks after the operation the patient ate some figs. Some of the fig stones were subsequently found on the dressings covering the abdominal wound. After many weeks the external wound became completely closed.

The patient, on his admission to The Infirmary, was seen to be a big stout man with a large protruding abdomen, and a flo-rid complexion. He complained of a constant dragging pain on the right side of

the abdomen. The pain and discomfort were worse when he walked about, and were sufficiently severe to prevent his carrying on his usual occupation. He, therefore, wished an operation for the relief of the hernia, and for the pain and discomfort arising therefrom.

A bluish scar, about four inches long and three quarters of an inch broad, was present in the right iliac region of the abdomen. In this position there was a protrusion, about the size of the closed hand. The swelling obviously contained adherent bowel.

At the operation I made an elliptical incision enclosing the scar tissue and going about half an inch beyond it. When the peritoneal cavity was opened and the sac exposed, it was seen that the herniated structures were the caecum and appendix. The caecum was firmly adherent over a wide area to the scar tissue, without the intervention of muscle or abdominal aponeurosis. It was found necessary to excise a portion of the wall of the caecum, where it was adherent to the scar tissue. This opening was closed by Lembert's sutures in the usual way. Some adhesions present within the abdomen were separated. The appendix was only slightly involved in the adhesions, the part of the caecum from which it arose not

being adherent to the sac. The appendix was approximately one inch long. Its end was not rounded off and smooth like the normal organ, but tapered off into cicatricial tissue, which formed a tag at the end of the appendix. Within its mesentery was found a bird shot. The appendix was amputated at its base, and the abdominal closed. On account of the numerous adhesions present, the operation was a difficult and prolonged one, at which I had the assistance of Mr. Skaife, the senior surgeon to The Infirmary.

An examination of the excised appendix showed that the lumen was patent for about three quarters of an inch from its caecal end.

The patient made a good recovery. He was provided with an abdominal belt. He remained well, with no recurrence of the hernia, when seen about one year after the operation.

REMARKS:-

This case is an example of a ventral hernia which followed an operation for an appendicular abscess. The contents of the sac were the caecum and appendix, the former organ being adherent to the sac. The hernia was, therefore, irreducible. The appendix is never present alone in a ventral hernia. There is

nothing remarkable about the hernial aspects of the case, the condition being a well-recognised one after an operation of the kind. In these cases a dragging pain (due to adhesions) is a constant complaint. The contents of the sac were what what one would expect in a hernia in that region and following an appendicular abscess.

The presence of the bird shot imprisoned between the layers of the meso-appendix is interesting. It opens up a train of thought as to what part, if any, it played in the production of the acute attack. I think it may be assumed that it was originally within the lumen of the appendix, and the appendix had perforated within the layers of its mesentery. The presence of the shot in the mesentery could hardly be accounted for in any other way. Other shot may possibly have been present, but escaped through the abdominal wound. By acting as an irritant, or by interfering with the drainage of the appendix, the shot may have lowered its vitality, and paved the way to bacterial invasion and its results, which, in this case, culminated in perforation and abscess formation, and gangrene of the apical portion of the appendix.

In regard to foreign bodies found within the appendix, Kelly & Hurdon (The Vermiform Appendix

and its Diseases, 1905) say that, of heavy bodies which gain access to the appendix, the most common are shot or bullets. They record five cases of appendicitis in which shot were found within the lumen of the diseased appendix. Deaver (Appendicitis 1905) says that Mitchell found 122 shot in one appendix. Lockwood (Appendicitis, its Pathology and Surgery, 1901) records a case of appendicitis within the sac of a right inguinal hernia where 6 or 7 shot were found within the herniated appendix. A microscopical examination of the excised appendix showed its walls to be much hypertrophied. Lockwood thinks that the hypertrophy was due to the presence of the shot, and that it was in some way related to attempts at expulsion of the foreign body.

The condition of the appendix in my case is also interesting. As already mentioned, it was only an inch long. It was obvious that it was a truncated appendix, the distal portion having sloughed off during the acute attack. The lumen of the proximal part still remained patent, and might have become the subject of another acute attack, if it had not been removed. One acute attack, even when it results in abscess formation and gangrene, does not prevent a second attack. It is important to bear this fact in mind.

The escape of the fig stones through the abdominal wound showed that the opening communicating with the bowel was at that time a considerable one. No doubt they escaped through the open end of the shortened appendix.

A Series of Seven Cases, from my own Practice,

to illustrate some Points alluded to in the Paper

Concerning

INTERNAL HERNIA

of the

VERMIFORM APPENDIX

with Commentaries.

Case VI.

Inflammation of an appendix herniated into the ileo-caecal pouch. Hip-joint disease simulated.

R.D., a boy aged 14 years, was playing football on the afternoon of 27th Septr.1906. He kicked violently at the football and missed it. He felt pain in the right hip, but went on playing. The pain got worse during the evening, and he went to bed early. He was seen next morning by Dr.Tidcombe. The patient then complained of pain in the right hip, and in the extensor muscles of the thigh. He was lying in bed with the right thigh semi-flexed. There was no sign of bruising. Percussion over the great trochanter caused pain in the right hip joint. The temperature was normal, and the pulse quiet. The diagnosis was synovitis of hip joint and strained muscles. Hot fomentations with laudunum were applied, and the boy kept at rest in bed with the limb supported on a pillow. From that time until Oct.9th the pain in hip gradually got better. He was allowed up for a short time on the 8th, and again on the 9th of Oct. On the morning of the 10th, at about 5 o'clock, he woke up complaining of feeling sick, and of increased pain in the hip. He was very sick after taking some milk, and

became collapsed about 10 a.m., when his mother gave him some brandy and water, and sent an urgent message for Dr.Tidcombe. When the latter arrived the patient was somewhat better, the temperature was 98° F., and the pulse 80. There was no tenderness in the iliac fossa, and there were good abdominal movements on respiration. The patient was seen again at 6 p.m. when the temperature was 100° F. and the pulse 100. The patient had felt sick but did not vomit. Slight general abdominal tenderness was present, and also slight rigidity of the recti muscles. Next day the temperature was 99.2 and the pulse 96. The boy had passed a restless night, and the pain and rigidity were much more marked over the right iliac region. He still complained most of pain in the region of the hip joint. At 6 p.m. the temperature was 100.8, pulse 110, pain and tenderness worse, and a definite diagnosis of appendicitis was made. At 10 p.m. the temperature was 101.8, and pulse 120. Next morning (Oct.12th) I saw the case in consultation with Dr.Tidcombe. The temperature was then 102.4, and the pulse 110. There was rigidity of the abdominal muscles over the right iliac fossa and pain on pressure over Mc.Burney's point. Even then the boy complained chiefly of pain in the region of the hip joint, and he kept the thigh in the

semi-flexed position. Immediate operation was advised. This was done at 3.30 p.m. by me with the assistance of Dr.Tidcombe and of Mr.Rawlinson F.R.C.S., who gave the anaesthetic. An incision through the abdominal wall was made in the usual place for appendicitis. There were no adhesions of the viscera to the anterior abdominal wall. When the caecum was exposed it was seen to be reddened and congested. The appendix was found arising from the postero-internal aspect of the caecum, and it turned directly upwards behind the large bowel. On passing my finger upwards behind the appendix, I found that it led into a peritoneal pouch at the ileo-caecal angle and the appendix was firmly fixed in it. I endeavoured, with my finger, to break down adhesions and get the appendix out of the pouch, but failed. I then decided on amputating the appendix at its origin from the caecum. After doing this, I succeeded in delivering the appendix from the peritoneal pouch, although with difficulty on account of its inaccessibility, and the presence of adhesions firmly binding it in the fossa. The distal third of the appendix was almost black in colour, and very friable. It contained a cylindrical concretion about half an inch long and a quarter of an inch in diameter. There was about a dracham of purulent material in the hernial

pouch. A gauze drain was put in, and the abdominal wound partially closed. The patient made an uneventful recovery, but for some days after the operation his chief complaint was of pain in the region of the hip.

REMARKS:-

This case is an interesting one from the following points of view:-

(1) It is a good example of hernia of the appendix into the ileo-caecal fossa. This was clearly demonstrated at the operation.

(2) The relationship of trauma to appendicitis.

(3) The simulation of hip-joint disease by appendicitis.

The case confirmed me in a previously formed opinion that the peri-caecal fossae are of considerable importance in the pathology of appendicitis. They are also of clinical significance, which I shall refer to in another place.

I think it may fairly be assumed that the following was approximately the sequence of events in the pathological history of this case. The appendix became herniated into the fossa. Its drainage was thus interfered with, and this opened the way to bac-

terial action. A mild form of infection was set up, and adhesions resulted, fixing the appendix within the fossa. It was then more vulnerable to bacterial action, which led to the gradual formation of a concretion. We have now an appendix which is diseased and liable to an outbreak of acute inflammation on the slightest provocation. That provocation was supplied by the football incident. The muscular action of the ileo-psoas muscle possibly broke down some of the adhesions or disturbed the concretion. A mild inflammatory attack was thus set up in an already diseased appendix, but which did not, at first, give rise to abdominal symptoms, but it did to pain referred to the region of the hip-joint. The symptoms referred to the latter region are easily explained from an anatomical standpoint, the diseased appendix being in contact with the ileo-psoas muscle, and also in relationship to the nerves supplying the hip-joint. The patient was kept at complete rest for about a fortnight after the injury at football, and, as a consequence, the pain gradually subsided. Immediately he got up and walked about a little, the symptoms became worse, and a typical attack of appendicitis supervened. I may add that this theory of the diseased process having extended over a considerable period is to some extent

confirmed by the fact that the boy had been subject to slight "bilious attacks" for which it had not been considered necessary to consult a medical man.

At first sight, it may seem that one ought not to mistake appendicitis for hip disease. I know, however, from my hospital experience, that chronic appendicitis is occasionally overlooked, and a diagnosis of hip trouble made. In some cases the differentiation is not so easy as one may think, especially in young subjects. In the case under discussion a diagnosis of hip disease was at first made by a medical practitioner who I know is a good observer and diagnostician. Gibney (Amer.Jour.Med.Sci. 1881 LXXX p.119) first drew attention to the danger of mistaking appendicitis for hip disease, and he has recorded several cases of appendicitis where the symptoms closely simulated that condition. Deaver, Kelly & Hurdon, Kelynack, Lockwood, and others have also drawn attention to this subject, and have recorded illustrative cases. The mistake will best be avoided by making, in all such cases, a careful examination of the abdomen in the appendicular region, especially noting whether there is any pain on deep palpation or rigidity of the abdominal muscles. If any doubt remains after careful examination of the abdomen, the hip joint, and

the back for spinal disease, the case should be kept under careful observation, and examined under an anaesthetic if necessary.

Case VII.

Intestinal obstruction caused by adhesions, the result of appendicitis.

Hernia of the diseased appendix into the ileo-caecal pouch.

Hip joint disease simulated.

K.G., aged 22 years, was admitted to Chichester Infirmary on March 17th, 1906, suffering from symptoms of intestinal obstruction. No definite history could be obtained from the patient as to the exact mode of onset and course of the illness. She said that she had been confined to bed ever since the birth of a male child in a workhouse infirmary in November 1905. Nearly the whole time since she had suffered from abdominal pain, which was most severe in the lower part and towards the right side. She had occasional sickness and vomiting, which became worse about a week before her admission to Chichester Infirmary, and for two days all food was rejected.

When admitted to The Infirmary, the patient was seen to be feeble, thin, and emaciated. She looked very ill, and lay in bed in the dorsal decubitus, with the right lower extremity flexed almost to a right angle at the hip joint. The temperature was 102.4° F., and the pulse rate 120 per minute.

Considerable general abdominal distensions was present, and marked fulness in the right iliac region. There was some redness of the skin just internal to the right anterior superior spine. There was great tenderness on palpation in the whole of the right iliac region, and also in the hypogastric area to the right of the middle line. On vaginal examination distinct pain was caused by palpation in the posterior and right-lateral fornices. The uterus seemed normal in size, but was firmly fixed to the right side of the pelvis. There was a slight purulent discharge from the uterus. The right thigh could not be extended. The patient frequently vomited a dark green coloured fluid after her admission to The Infirmary, and she did not retain any food given by the mouth.

A provisional diagnosis was made of intestinal obstruction, due to adhesions, probably the result of a pyosalpinx.

I operated on the case a few hours after her admission. An incision was made along the outer margin of the right rectus muscle in the iliac region. When the abdominal cavity was opened, a small quantity of pus was found just internal to the right anterior superior iliac spine. Internal to this point, and extending into the pelvis were extensive and old stand-

ing adhesions which were found to involve the caecum, the ileo-caecal junction and lower part of the ileum, the right broad ligament, and the uterus. The uterus was fixed to the right side of the pelvis, the right Fallopian tube was adherent to the caecum, and the ileo-caecal junction was firmly fixed to the peritoneum over the pelvic brim and the right iliac vessels. The adhesions so firmly fixed the lower end of the ileum, and dragged upon it, that it was evident its lumen was obstructed there. The Fallopian tube did not seem to be the primary seat of the disease, and the appendix was therefore looked for. After a prolonged search its origin from the caecum was ultimately discovered, where it was firmly imbedded in, and surrounded by inflammatory new formation. Its origin from the caecum was divided, and its course traced. It turned on itself, passed upwards and disappeared into a fossa at the ileo-caecal junction. On account of the dense adhesions which fixed it in that position, it was found impossible to remove the greater part of the appendix. This structure was in so distinctly a diseased condition that it was deemed to have been the origin of the illness. The adhesions fixing, and dragging upon, the ileum were separated so as to restore the lumen of the bowel. The area of

operation was carefully cleansed, a gauze drain put in and the abdominal wound partially closed.

Whilst the patient was under the anaesthetic, an attempt was made to extend the hip joint, but it could not be done.

The operation was a difficult one, and occupied over an hour. The patient was very ill for two or three days following the operation. There was not much vomiting. The temperature varied from 99 to 101. There was a good deal of collapse, and the pulse rate went up to 140. The patient began to improve on the third day, vomiting then ceased, and subsequently steady progress was made. There was a good deal of discharge from the wound, which did not cease for many months, and only after the sinus had been scraped twice. On the 22nd of March the right parotid gland began to swell, and about three days later the left one likewise became inflamed and swollen. The inflammation gradually subsided without any pus formation. For many weeks after the operation the right hip joint continued flexed, and, for a time, she was considered to have coincident hip disease. Full extension was ultimately obtained by the use of weights and pulleys, but the patient did not regain free movement in the joint until nearly twelve months after the operation.

REMARKS:-

This case presents the following features worthy of consideration:-

(1) The herniated condition of the appendix.

(2) The intestinal obstruction.

(3) The hip-joint condition.

(4) The parotitis.

I have already referred to the importance of the ileo-caecal fossa in regard to hernia of the vermiform appendix, and to the difficulties frequently experienced in finding and removing it in these cases.

Intestinal obstruction is a by no means uncommon complication of appendicitis. It may occur during an acute attack, or subsequent to an acute or chronic appendicitis, or after an operation, especially if an abscess were present. In most of these cases, the obstruction is due to adhesions which mechanically block the lumen of the bowel.

I have already referred to the occasional mimicry of hip-joint disease by appendicitis. In this case the flexion at the joint, the resistance and pain caused on attempts at extension, were all very marked. Indeed, even now I cannot be quite sure as to whether there was not some coincident disease of the hip-joint.

The occurrence of parotitis is a well-recog-

nised although an uncommon complication after abdominal operations. In the London Hospital series of 1,000 cases of appendicitis compiled by Mr.Lett (Brit.Med.Journal 4th March, 1905, p.461) four exampled are noted, in none of which did the glands suppurate. In my own series of 90 operations for appendicitis, it occurred in two cases; in the case now being commented on, and the other in a boy of about 14 years of age, who had a bad attack of suppurative appendicitis. Both of his parotid glands suppurated during convalescence and were incised, a large quantity of pus escaping. He made a good recovery.

I think the diagnosis of primary tubal trouble was justified by the history obtained from the patient, especially as she dated her illness from the birth of her child. The fixation of the uterus, and the presence of some purulent discharge from the uterus supported the diagnosis. It is, to be sure, possible that it may have been the primary trouble, and that the infection spread to the appendix, which was thus secondarily involved. The appearance of the right tube negatived this, and it looked so healthy that it was not considered necessary to remove it.

Case VIII.

Appendicitis with concretion and gangrene.

Two hairs in the concretion.

Hernia of appendix into the caecal pouch.

E.J., a book-binder aged 27 years, was taken suddenly ill on the 11th of October 1906, with severe abdominal pain, vomiting, and diarrhoea. The pain was of a most severe and paroxysmal character, and was located in the umbilical region. By 10 p.m. of the same day the pain had become localised in the right iliac fossa. He was very ill all that night, and on the following day he sent for Dr.Buckell, who advised his removal to the Chichester Infirmary.

On admission the patient seemed in great pain. Abdominal facies was well-marked. Temperature 103° F., pulse 88, breathing thoracic and 28 per minute. There was great tenderness on pressure in the right iliac fossa. There was no cutaneous hyperalgesia. Rigidity was very marked in this region, and no tumour could be felt. On percussion the abdomen was tympanitic generally, but dull over the appendicular region. The right thigh was kept flexed, and great pain was caused by attempted extension. A diagnosis of gangrenous appendicitis was made.

I operated on the case about 45 hours after

the first appearance of the symptoms. The usual parietal incision was made, and when the abdomen was opened, several ounces of very bad smelling pus escaped. After the abscess cavity had been cleansed with dry swabs, the appendix was looked for. It was readily found arising from the lower end of the caecum. At first directed downwards and backwards, it became acutely flexed on itself and then went upwards. It was an unusually long appendix, and its apical portion was contained within an ileo-caecal pouch. The appendix, distal to the flexure, was in a gangrenous condition, and contained the concretion. The diseased organ was amputated at its origin from the caecum and removed. The whole of the contaminated area was then carefully wiped out with sterile swabs, a drainage tube put in and also gauze packing to act as an additional drain, and finally the parietal incision was partially closed up. The patient made a good recovery, and the sinus was quite closed by the end of November, when he was discharged from the Infirmary.

When the concretion was examined it was found to consist of the usual inspissated material, which was slightly calcareous, and contained two hairs, each about one and a half inches long. These hairs were twisted about within the concretion, and seemed

to hold it together in much the same way that hairs do which I have seen used in making mortar.

REMARKS:-

This case presents the following points of interest which are worthy of consideration:-

(1) The rapidity of the pathological process.

(2) The not unusual combination of ulceration, concretion, perforation, and gangrene.

(3) The presence of the hairs in the concretion.

(4) The position of the appendix relative to the ileo-caecal pouch.

(5) The absence of cutaneous hyperalgesia.

In this patient the clinical manifestations and the pathological process developed with such rapidity that the case may well be described as one of fulminating appendicitis. I carefully enquired into the history of the case both before and subsequently to the operation, and found that the patient had been in good health until the sudden onset of acute attack at 5 p.m. on the 11th of Oct. He had never before been ill since childhood, or required the services of a medical man, except on one occasion about 5 years

previously, when he had an attack of violent abdominal pain, which he described as "cramp in the stomach". That illness kept him in bed for two or three days. It was probably an attack of appendicitis, and from that time onwards, the appendix, it may be assumed, was in a diseased condition, although it did not give rise to any active symptoms. The presence of the concretion within the appendix, which had obviously taken a long time to form supports this view. A concretion may be a considerable time within an appendix without giving rise to any symptoms. They are frequently found in the appendix at post-mortem examinations, and yet there had been no symptoms of their presence during life.

In this case there were three conditions present in the appendix, and one, or more, of which might account for the acute attack. These are:-

(1) The presence of the two hairs.

(2) The acute flexion of the appendix.

(3) The herniated position of the appendix.

It would be interesting to know exactly which of these factors was chiefly concerned in the actiology of the diseased process.

In regard to the hairs, I examined these carefully and found that they were similar to those

of his moustache, and it may be assumed that this was the source of the hairs, so closely did they resemble each other. The patient having swallowed them, they ultimately found their way into the appendix. How did they get there? In this case the caecum was of the foetal type, its end gradually tapering off into the appendix. This anatomical arrangement would facilitate the entrance of the hairs into the appendix. There they would act as an irritant, and set up the vicious sequence of catarrh, bacterial invasion, formation of concretion, ulceration, and gangrene.

On the other hand the hairs within the appendix may have set up abnormal movements and contractions of the appendix in its efforts to expel them. During these movements it may have become herniated into the ileo-caecal pouch, and become fixed there, when the hernia would constitute an additional pathological factor contributing towards an acute attack.

The flexure of the appendix, which may have been due to the anatomical arrangement of the meso-appendix, would, in itself, by interference with the drainage of the organ, be a sufficient cause for the acute attack. There is no doubt that flexions,

angulations, and torsions of the appendix are frequent causes of inflammation. The importance of defective drainage in the pathogenesis of appendicitis cannot be overestimated.

The absence of cutaneous tenderness in this case supported the diagnosis of perforation and gangrene of the appendix. Two varieties of tenderness are met with in appendicitis - the superficial and the deep. Deep tenderness is always present, and is one of the most valuable diagnostic signs. Superficial tenderness, also called cutaneous hyperalgesia, is also very constantly present, but not invariably so. It is due to reflex stimulation of cutaneous nerves which come from the same region of the spinal cord as do the intrinsic nerves of the appendix. This symptom of cutaneous tenderness in appendicitis has been especially studied by Sherren; and I have been much interested in it since he kindly sent me a reprint of his article on the subject which appeared in the Lancet of 19th Sept. 1903. Sherren found that in appendicitis the usual area of cutaneous tenderness was in the form of a triangle in the right iliac region. Sherren says that the lower boundary of this triangle reaches almost to Roupart's ligament, its inner almost to the middle line, and its apex is a little outside the

anterior spine, sometimes extending to the mid-axillary line. This tender area may, however, vary from a small circular spot a little above the middle point between the umbilicus and the enterior superior spine, to a complete band extending on the right side from the middle line below the umbilicus in front to the lumbar spines behind. Its presence is tested, and its boundaries defined, by gently stroking or pinching the skin, beginning in an area which is not tender and working towards the suspected area. The "appendix triangle" of cutaneous tenderness disappears gradually as the case improves, and, in a first attack, rarely persists after the 6th or 7th day. If, however, the superficial disappears without, at the same time, an improvement in the general condition of the patient, it is a sign of perforation or gangrene of the appendix. I have been able to corroborate Mr.Sherren's observations in a few cases, but the majority of cases of appendicitis, when they come under my observation in hospital, are already the subjects of abscess or gangrene, when the stage of cutaneous tenderness has passed. The presence or absence of cutaneous tenderness is a valuable sign when taken in conjunction with other symptoms. Rolleston (quoted by Deaver) however, says that cutaneous hyperalgesia

may also be caused by other abdominal affections. He found it present in a case in whom an operation disclosed a normal appendix, but there was a gland near the caecum inflamed and softened.

In the estimation of the gravity of the pathological lesion and as a guide to prognosis in appendicitis the information obtained from the pulse is of much more value than that derived from the temperature. The latter is frequently not much raised even when the lesion is a grave one; the pulse is invariably affected, either in rate or in character. A rapid pulse of poor volume is always a grave sign, especially if the acceleration is proportionately greater than the rise in temperature. The relation of the pulse rate (88) to the rise in temperature (103) in this patient is interesting. If we take 10 per minute as the usual acceleration of the pulse for each degree rise of temperature then the pulse rate should have been 120 (75 being the normal rate). Subsequently, however, after observation extending over several weeks, it was found that his normal pulse rate was 52. It was therefore accelerated by 36, which equals about 9 for each degree rise of temperature. Hence there was no real disproportion between the pulse rate and the temperature. It follows that the possibility of an abnormally slow pulse in health should be remembered

and attention should be paid not only to the rate, but also to the character of the pulse, especially in regard to volume and regularity.

It should also be remembered that when pus has formed , and the abscess cavity well shut off from the general abdominal cavity, not much absorption is going on and consequently the pulse and temperature may be normal, or only slightly above normal, notwithstanding the fact that a perforated or gangrenous appendix may be found at operation within the abscess cavity. In many of these cases the pulse is quiet and does not exceed 90. If it is more than 90, and especially if over 100, it is an indication that active processes are still going on, that septic absorption is taking place, and that the abdominal cavity is not very firmly shut off from the abscess cavity.

Case IX:-

Recurrent attacks of appendicitis with abscess formation in connection with a herniated appendix.

H.R.M., aged 47 years, was admitted to Chichester Infirmary on the 26th of March, 1907, suffering from acute appendicitis. The following are the chief points in regard to his previous history. He had several attacks of appendicitis. In the year 1900, he was taken suddenly ill with pain in the right side of the abdomen. This attack was not a severe one, as it lasted only a few days. In 1902 he had a similar attack, but on that occasion he was confined to bed for about a fortnight. Again in Oct.1904, he had acute appendicitis, during which I saw the case in consultation with Dr.Morris of Bognor. There was then well-marked evidence of an appendicular abscess. The breathing was also rapid, and crepitations were heard over the base of the right lung. With Dr.Morris's assistance I opened the abscess on the 25th of Oct. 1904. A good deal of foetid pus was evacuated. The abscess cavity was surrounded by firm adhesions, and seemed well shut off from the general abdominal cavity. The appendix could not be seen, or felt. The abscess cavity was packed and drained with gauze. In regard

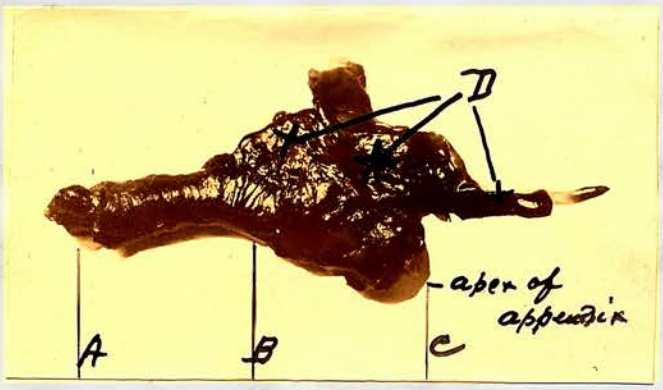
to the abdominal condition, he did very well after the operation. The slight respiratory embarrassment, which was present when he was operated on, increased, and it became evident that fluid was accumulating in the right pleural cavity. Dr.Morris explored with a needle, and the fluid drawn off, when examined under the microscope, was seen to contain pus cells. On the 26th of Oct. I again saw the case with Dr.Morris, when I excised a portion of rib, and opened the right pleural cavity. A considerable quantity of slightly turbid fluid came away, and a drainage tube was put into the cavity. At that time the abdominal woumd looked well, and had nearly closed up. There was no sign of any abdominal complication. The patient immediately began to improve after the second operation and, from that time onwards, did very well. The drainage tube was removed from the chest at the end of a week, and both the abdominal and chest openings had closed up before the end of November. He had no more attakcs until a little over two years afterwards. On the 2nd of Nov. 1906, I saw him in consultation with Dr.Collins of Yapton. There was then distinct fulness, rigidity, and tenderness on palpation, in the right iliac region. The temperature was 101° F., the pulse 100, and respirations 28. On the 4th of Nov. I evac-

uated an abscess cavity situated to the outer side of and behind the caecum. There were dense adhesions and I failed to find the appendix, although I made a somewhat prolonged search for it. The patient made a good recovery, and the abscess cavity had closed up about five weeks after the operation. He was advised to have the appendix removed during the quiescent period, and although he acquiesced in the advisability of this course, he kept putting it off. On the 23rd of March, 1907 he was again seized with acute pain in the abdomen, which subsequently became localised in the right iliac region, and developed all the symptoms of an acute attack of appendicitis going on to formation of pus. On this occasion he was sent into Chichester Infirmary where he came under my care on the 26th of March, 1907. His general condition was then fairly good. Temperature 100, pulse 100, respiration 26. There was great tenderness in the right iliac region. In the other regions of the abdomen there were movements on respiration. Beneath the old scar, an elongated, hard swelling could be felt. At the operation I made an elliptical incision enclosding the old scar. When the abdomen was opened, the lower end of the ileum was found to be adherent to the abdominal wall in the site of the scar. It was the adherent bowel

which was felt as an elongated swelling before the operation. The adherent bowel was freed. On further exploration, the caecum was seen to be reddened and inflamed and bound down to the posterior abdominal wall. An abscess cavity seemed to be situated behind it, but before exploring this region, I packed it all round with abdominal sponges, and then pushed my finger through adhesions behind the caecum, and passed it into an abscess cavity, from which a few ounces of offensive smelling pus escaped. Again the appendix could not be seen or felt. It was only after a prolonged search, and extensive separation of adhesions, that it was found to pass upwards and inwards from the caecum to disappear into the mouth of a peritoneal pouch situated at the ileo-caecal angle. It was with difficulty removed from this pouch, where it was firmly fixed by adhesions, and some of the tissue forming these came away with the appendix. This organ was amputated at its origin from the caecum, the area of operation cleansed, the abdominal sponges removed, a gauze drain put in, and the abdominal wound partly closed. The patient did very well, his convalescence was uninterrupted, and he was discharged from The Infirmary on the 18th of April 1907, i.e. 24 days

after the operation, when the abdominal wound had closed up.

I append a photograph of the excised appendix. The whole appendix was thickened and inflamed and partly necrosed. The lumen was patent from A to B in the photograph. From B to the apex C the lumen was obliterated, and this portion of the organ was much thickened and consisted of hard, sclerosed tissue. There were two small cystic cavities in this portion, which were probably the remains of the original lumen. There was no concretion, and none were evacuated with the pus, either at the last operation, or at any of the previous ones. The part indicated by D consisted of inflammatory new tissue which bound the appendix in the hernial pouch, and was the cause of the difficulty in enucleating it.



REMARKS:-

This case is an excellent example of "the prospects and viscissitudes" of a patient who is the possessor of an appendix which is herniated into a retro-peritoneal pouch. I have already said that a herniated appendix wherever it may be, is liable to become diseased, chiefly on account of imperfect drainage. The appendix of this patient occupied the ileo-caecal pouch. It became diseased. For many years it was the cause of ill-health to the patient, and it frequently constituted a real danger to his life. An examination of the excised appendix showed that it was still a potent factor in the production of disease, and it would almost certainly have done so if it had been allowed to remain. Neither its structure nor its lumen was destroyed. R.Morris of New York, (quoted by Rose & Carless) says "The infected appendix is a cap which sometimes snaps, sometimes flashes, and sometimes causes an explosion, and none of us can tell in advance what is going to happen". For many years the appendix in this patient was in a very unhealthy condition, and its potentiality as a dangerous factor may be compared to that of a loaded pistol at full cock, which, when left at rest, causes no harm, but on the application of even the slightest

disturbing force, it goes off with results more or less disastrous.

When I first began to operate on cases of appendicitis with abscess formation, I contented myself with opening and draining the abscess, and did not attempt to remove the appendix unless it could easily be done without disturbing the adhesions. I believed that the immediate care of the surgeon was to save the patient's life, and that it would be jeopardised by making any prolonged effort to find and remove the appendix. This used to be the teaching of many authorities on appendicitis, notably, Sir Frederick Treves. He thought that "the patient who had a perityphlitic abscess, was ipso facto, cured of his malady, and that although he might have further trouble with the abscess, he need fear no other attack of definite appendicitis", Sir Frederick Treves now believes that this assumption is not correct (Brit.Med.Journal March 4th 1905 p. 461). After some years experience, I observed that those cases of appendicitis with abscess formation in whom the appendix was not removed at operation, occupied beds in Hospital much longer than similar cases from whom the appendix had been removed. A Comparison may be made in this way. The duration of time

that a patient occupies a bed whose appendix had been removed at operation was measured in weeks. The cases from whom the appendix had not been removed occupied a bed for as many months. Moreover, the resulting sinus in the non-removal cases frequently refused to close until a second or even a third operation had to be undertaken for its relief. Again, a patient in whom a diseased appendix remains, must either face another serious operation or live in constant dread of another attack. In regard to the frequency with which further attacks of appendicitis occur in cases of local abscess in which the appendix has not been removed, Lett, in his London Hospital Statistics (Brit.Med. Journal March 4th 1905, p.462) places the number at 17.2 per cent.

I now never feel satisfied after operating on a case with appendicular abscess, if the patient is removed from the operating table without the appendix having been removed. During the last two years it has been my practice, if the patient's condition permitted it, to make a determined effort to find and remove the appendix. I have not yet regretted it, and I have not seen a death which could be attributed to any extra manipulation necessary in order to find the diseased structure. If the diseased area is carefully packed

round with sponges, and the field of operation carefully cleansed out with sterile swabs, (not washed or flushed out, which I believe to be bad practice) the risk of contamination of the general abdominal cavity is comparatively small. The patient under discussion is an example. There was an abscess cavity, extensive adhesions, unusual difficulty in finding the appendix on account of its herniated position and adhesions, and yet all the manipulations thus rendered necessary did not in any way interfere with his recovery. My present opinion is, therefore, that in all cases of appendicular abscess, if the operator has sufficient skill and experience, a determined effort should be made to find and remove the focus and origin of the mischief - the diseased appendix.

Pleural effusion is not a common complication of appendicitis. In 1000 consecutive cases at the London Hospital (Brit.Med.Jour. March 4th 1905, p.461) there were two instances of pleurisy with effusion, and seven cases of empyaema. In my own series of cases two had pus in the right pleural cavity. Both recovered after an operation for its evacuation. In neither case was there a sub-diaphragmatic abscess.

Case X.

Hernia of the appendix into the sub-caecal pouch.

C.H., a coachman aged 52 years, was admitted to Chichester Infirmary on the 19th of August 1903, with a view to operation for appendicitis. The following are the main points in regard to his previous history. For about ten years prior to his admission to The Infirmary he had frequent attacks of abdominal pain accompanied by diarrhoea and sickness. These illnesses, which were described as bilious attacks, usually confined the patient to bed for a few days, but he was rarely off duty for more than a week. Nearly every autumn he had one of these seizures. The present attack began in much the same way as the previous ones did. It began on the 13th of August (i.e. six days before his admission to Chichester Infirmary) with diarrhoea and pain in the abdomen around the umbilicus. He vomited, and relief seemed to be obtained. He slept well that night, and felt well on the following morning. About 11 a.m., the abdominal pain returned and, during the course of the day, it became fixed in the right side of the abdomen. On the following day he was seen by Mr.Venning (now Sir Edgcombe Venning) who then happened to be on a visit

to the house in this district where the coachman was employed. Under his treatment the patient improved, and he was much relieved. The pain again returned on the fifth day. At this stage of the disease I saw the case in consultation with Mr.Venning, when we agreed in thinking the condition due to appendicitis, and that probably an operation would be required for its relief. The patient was accordingly removed to Chichester Infirmary.

When he was admitted to The Infirmary the temperature was 100° F., and the pulse 104. His general condition was good. He complained of pain in the right side of the abdomen. There was a slight fulness seen in the appendicular region, and, on palpation, rounded swelling situated within the abdomen somewhat higher, and more towards the right lumbar region, than the usual appendicular one. There was tenderness over the part, and the percussion note over it was impaired. Next day the patient felt better, his temperature was normal, and the pulse 86. He continued to improve and it was decided to defer the operation, with a view to the removal of the appendix in the quiescent state. The swelling, however, did not disappear, and although the temperature and pulse were normal, it was decided to operate on the 24th of

September. Mr.Venning was present at the operation, at which I was assisted by my colleague Mr.Skaife. An incision was made over the swelling, and when the andomen was opened the caecum was seen to be covered by a good deal of inflammatory tissue. The chief focus of the disease seemed to be behind that organ, and the appendix, surrounded by a good deal of inflammatory tissue, was found directed upwards behind it, its bent apical portion being situated behind the colon. A few drops of pus were seen around the appendix, which was thickened and inflamed and was partly necrossed. The appendix was removed.

The patient made a good recovery, but a ventral hernia subsequently resulted. He is quite comfortable with an abdominal belt.

REMARKS:-

This is an example of a hernia of the appendix into the sub-caecal pouch, where the inflammatory mischief had remained circumscribed. The singularity of the case consists in the frequency and mildness of the previous attacks. Although appendicitis had not been diagnosed before, yet I think it may be assumed that these "bilious attacks" were caused by appendicular trouble. It is now three years and a

half since the operation, and he has had no recurrence of similar trouble, and he does not now find it necessary to exclude certain articles of diet which he had to do before the operation. One can readily imagine that an appendix herniated into, and coiled within, one of the peri-caecal fossa may remain for years in a sort of chronically inflamed condition, and not give rise to symptoms more severe than those produced by an ordinary "bilious" attack, until ultimately it culminates in an acute attack as in this case and in others of my illustrative series.

Case XI.

Hernia of the appendix into the sub-caecal fossa.

Diffuse peritonitis.

A.E.C., a domestic servant aged 16 years, was admitted to Chichester Infirmary on Monday the 3rd of April, 1907, suffering from acute appendicitis. On Monday, the 1st of April, she was seized with acute pain in the right iliac region, accompanied by vomiting. The pain, in the course of the day, spread to other parts of the abdomen, and was described as being of an agonising character. There was an evacuation of the bowels shortly after the onset of the pain, but there was no subsequent movement until after she came into The Infirmary. She had very little sleep, and she was said to have been delirious for about 24 hours prior to her admission. Micturition was also painful, but quite free.

In regard to her previous history she was said to have had jaundice four years ago, which confined her to bed for three weeks. At the time of onset of the present illness she was recovering from an attack of influenza.

After her admission to The Infirmary, the patient was seen to be very ill. She lay on her back,

with the knees drawn up. The face was flushed and wore an expression of great pain. The breath was offensive, and the tongue dry and thickly coated with fur. The breathing was thoracic, with scarcely any perceptible abdominal movement. The abdomen was generally somewhat distended. Pain on palpation was intense everywhere but especially in the right iliac region. No localised swelling was felt in this region. The temperature was 100.6° F., the pulse 128, and the respirations 28.

A diagnosis of acute appendicitis with perforation and diffuse peritonitis was made.

I operated on the case a few hours after admission. An incision was made along the outer border of the right rectus muscle in the iliac region. When the abdomen was opened a large quantity of thin, turbid pus flowed out from all directions within the abdomen. Small intestine presented in the wound. It was red and injected, and here and there covered with lymph. The appendix was readily found arising from the posterior aspect of the caecum, from which it passed directly upwards behind it, the greater part of it being situated in a peritoneal pouch behind the colon, in which position the appendix was curved on itself. The few adhesions present were separated, and

the appendix withdrawn from the fossa, which admitted the terminal division of two fingers. The appendix was deep red, almost black, in colour, and was swollen and thickened, especially in its distal two thirds. There was free communication between the general abdominal cavity and the area around the diseased appendix. Abdominal sponges of gauze wrung out of hot sterilised water had been placed within the abdomen all round the ileo-caecal region after the first flow of pus had subsided. The appendix was amputated at its base. The abdominal sponges were now removed and unsoiled ones re-inserted. Attention was then given to the pelvic cavity, from which a good deal of pus was swabbed out. Special attention was similarly paid to the pouch in the region of the right kidney, and under the liver. The original abdominal wound was enlarged in order to do this. The remaining abdominal sponges were then removed, a large split rubber drainage tube with a wick of gauze inside it passed down into Douglas's pouch, gauze drains were also passed up towards the right kidney, towards the middle line, into the pelvis, and the ileo-caecal region, and the abdominal wound partially closed. A saline injection with brandy was given per rectum before the patient left the table,

and this was repeated four hourly for a few days following the operation.

A naked eye examination of the excised appendix showed it to be swollen and inflamed. There was a constriction of its lumen about one third of its length from the base. The lining of the distal two thirds of the appendix was blackish green in colour and necrosed. The lining membrane of the proximal third was red and congested, but not necrosed. The only contents of the appendix was a small quantity of dark coloured muco-purulent material. There was no evidence of there having been any concretion.

The patient continued to be very ill for some days after the operation. There was a moderate amount of vomiting during the first 48 hours, and also a good deal of general abdominal distension: On the third day the vomiting ceased, and the pulse became stronger and less frequent. The dressings were frequently changed during the first few days, and the various gauze drains gradually withdrawn, until on the fifth day all the original packing was removed, new drains being inserted. From the third day the patient made good progress, and she is now (the 17th of April) 14 days after the operation doing very well, and out

of danger. The abdominal movements are quite free on respiration, and the distension has disappeared. A moderate quantity of pus is still being discharged from the abdominal wound.

REMARKS:-

n This case presents the following points of practical interest:-

(1) The position of the appendix.

(2) The sudden onset of the illness, and the rapid development of grave symptoms.

(3) The occurrence of the illness during convalescence from influenza.

(4) The wide-spread peritonitis.

An examination of this appendix showed that it had been in a diseased condition before the present attack occurred. The appearance of the tissues at the site of the constriction of the lumen of the appendix was such as to lead to the conclusion that the changes there were not of recent formation. In cases of acute appendicitis.it is by no means uncommon to find changes in it which were apparently not of recent origin, although no history could be elicited of any previous appendicular trouble.

This appendix was herniated into a periton-

eal fossa. A herniated appendix, wherever it may be is likely to become diseased. In this case, it was somewhat coiled and bent on itself, and the point of most acute flexion was at the site of the constricted lumen. The angulation of the herniated appendix would interfere with the normal contraction of the organ, and also with its free drainage.

In regard to the etiology of the diseased process, the position of the organ relatively to the psoas muscle is also of some importance. During the contractions of this muscle an appendix thus situated would be exposed to abnormal friction, and its vitality may have been thereby lowered. It is a well known fact that micro-organisms more easily invade tissues which have altered by traumatism than they do healthy tissues.

The onset of the illness was very sudden, and grave symptoms developed with alarming rapidity. No doubt perforation of the appendix occurred at the onset of the illness, and a large number of virulent organisms were let loose into the general abdominal cavity.

The occurrence of the illness during convalescence from influenza raises an interesting train of thought as to what part, if any, it played in the production of the attack of appendicitis. During the last six months ending in March last

I have had to deal with an unusually large number of severe cases of the disease, having operated on 20 patients suffering from it. During the same period there has been an epidemic of influenza, in a more than usually severe form. There are many careful observers who believe that there is a distinct causal relationship between influenza and appendicitis. Armour (The Practitioner, Vol.LXXVII, "Influenza and Appendicitis") mentions several authorities who believe that there is a definite pathological relationship between influenza and appendicitis. Sherren (The Practitioner, Vol.LXXIV) thinks that influenza has some share in the peculiar fluctuation in the increase of appendicitis, but he is extremely doubtful as to whether it can be blamed for the whole of it. He, however, drew up a table to show the relationship between the number of cases of appendicitis and of influenza under treatment at the London Hospital. This table shows that, with one exception, the years of greatest increase of appendicitis were those in which the greatest number of cases of influenza were under treatment. He also thinks that there is a much greater correpondence between the number of cases of influenza under treatment, and the death rate of appendicitis.

The year with the greatest death rate of appendicitis, 1889, is the year in which the largest number of cases of influenza were under treatment.

I have never been able to satisfy myself as to any definite relationship between influenza and appendicitis, except that it may precipitate an attack in a previously diseased appendix, by lowering the vitality of the tissues. About 20 per cent. of the 20 cases operated on by me during the last six months gave a history of recent influenza, but in all of them the excised appendix showed evidence of previous disease.

When I first began to operate, I used to flush out the abdominal cavity with sterlised lotion when there was pus free within it, and diffuse peritonitis. The death rate was disappointingly high. Approximately, three cases out of every four, of this grave form of appendicitis, were expected to die. In course of time I operated on a somewhat desperate case of general peritonitis resulting from appendicitis, when a flushing apparatus was not available. On that occasion I swabbed out the abdominal cavity in much the same way as described in this case. The patient recovered. Since then I have invariably adopted the same method, with the result of a greatly lessened

mortality. Instead of expecting three deaths out of every four cases, I now look for three recoveries in four cases. In these cases, although so far as one can determine from the symptoms and signs there is general peritonitis, yet I think that, although the peritonitis is diffuse, the entire abdominal cavity is not really infected, or at any rate the right side of the abdomen and the pelvic cavity are chiefly infected. Although flushing out in these cases carried off a considerable amount of infective material yet at the same time it carried some to parts of the abdominal cavity which was either not affected, or only slightly so. If the whole abdominal cavity is equally infected in these virulent and acute cases, I think it matters not a great deal which line of treatment one adopts; they almost certainly will die.

Case XII:-

Acute appendicitis.

A long appendix fixed in the ascending meso-colon.

S.P., a Carter aged 21 years, was admitted to Chichester Infirmary on the 19th of April 1907, suffering from an acute attack of appendicitis.

About 7 a.m. on the 17th of April, 1907 he felt some pain and uneasiness in the epigastric region after partaking of some tea and cake. This pain gradually increased, until at 10 p.m. it was very severe. During that night the pain continued, but moved to the right lumbar region, where it was described as of a cutting or stabbing character. He also began to cough frequently, the act being productive of much pain in the right side. Next morning he began to vomit, and a good deal of dark greenish material was brought up at intervals during that day. Mr.Rawlinson, of Bognor, saw him on the evening of the second day, i.e. on the 18th of April, and he diagnosed appendicitis and advised immediate removal to Chichester Infirmary.

The patient had similar attacks extending over many years, but none of them were of a severe character, having usually passed off within 48 hours.

He was admitted to Chichester Infirmary

early on the morning of the 19th of April, i.e. within 48 hours of the onset of the illness. He was a strongly built and powerful looking man. He had a dry, frequent, and painful cough. His general condition was fairly good. The breath was offensive and the tongue thickly coated with fur. The temperature was 100° F., the pulse 108, and the respirations 28. During respiration the abdominal wall moved fairly well except on the right side. There was well-marked rigidity of the right side of the abdomen from the iliac fossa to the costal margin. There was marked superficial tenderness (cutaneous hyperalgesia) from the right mammary line round the flank to the scapular line behind, and from the costal margin in front to nearly the level of the right iliac spine. Great pain was caused by bi-manual pressure in that region, and the pain on deep pressure was especially severe under the costal margin in the region of the gall bladder.

Crepitations were heard over the base of the right lung, but no friction sounds were heard.

A diagnosis was made of an acute inflammation in an unusually highly-placed appendix.

The condition disclosed at the operation do done a few hours after his admission, was an interesting one. An external incision was made, higher than the

usual appendicular one. When the abdomen was opened the appendicular region was first explored. The caecum was in its usual position on the right iliac fossa but it could not be brought into the wound on account of the presence of a meso-caecum. There was no evidence of inflammation in it. Although a careful search was made, the appendix could not be seen or felt, nor could any fossa behind the caecum be found. I then passed my finger upwards on the outer side of the right colon towards the liver. I came upon an elongated inflammatory mass whose upper extremity reached the under surface of the liver. A small amount of pus was evacuated from it, and an examination of the inflammatory mass showed that it contained the apical portion of the appendix. On palpation though the peritoneum to the outer side of and behind the colon and below the inflammatory mass, a cord like structure was felt. I made an incision through the peritoneum over it, and found the appendix behind the colon, and seemingly in an extra-peritoneal position. The adhesion fixing the apical portion of the appendix were separated, and the appendix traced downwards to its origin from the caecum, the opening in the peritoneum on the postero-external aspect of the colon being enlarged. It was amputated at its origin from the caecum, a ligature only being

placed round it, no more elaborate method being possible owing to the inaccessibility of that part of the caecum. A gauze drain was put into the abdomen, and the external wound partly closed

I append a photograph - natural size - of the excised appendix. It is seen to be six inches long. The photograph does not show the whole appendix, as a small part of the apex was torn away when the adhesions were being separated. A short portion of its base was also cut away separately, as I at first left too long a stump. The entire appendix, therefore, measured between six and a half and seven inches in length. The apical two inches when examined were seen to be in a swollen and inflamed condition and partly necrosed. There was no concretion in the lumen, but the lining membrane of the swollen portion was blackish green in colour and semi-gangrenous looking. The remainder of the appendix looked healthy.

REMARKS.

The singularity of this case consists in the great length of the appendix, and its vertical position behind the caecum and colon, where it seemed to be situated extra-peritoneally.

The apparent extra-peritoneal position of the appendix is worthy of note, and is difficult to

understand. I have seen a long appendix arising in the usual position from the caecum pass upwards and outwards to the outer side of the right colon and terminate in the region of the gall bladder. This appendix was not of that type, because I had to make a definite opening through peritoneum in order to reach it behind the colon.

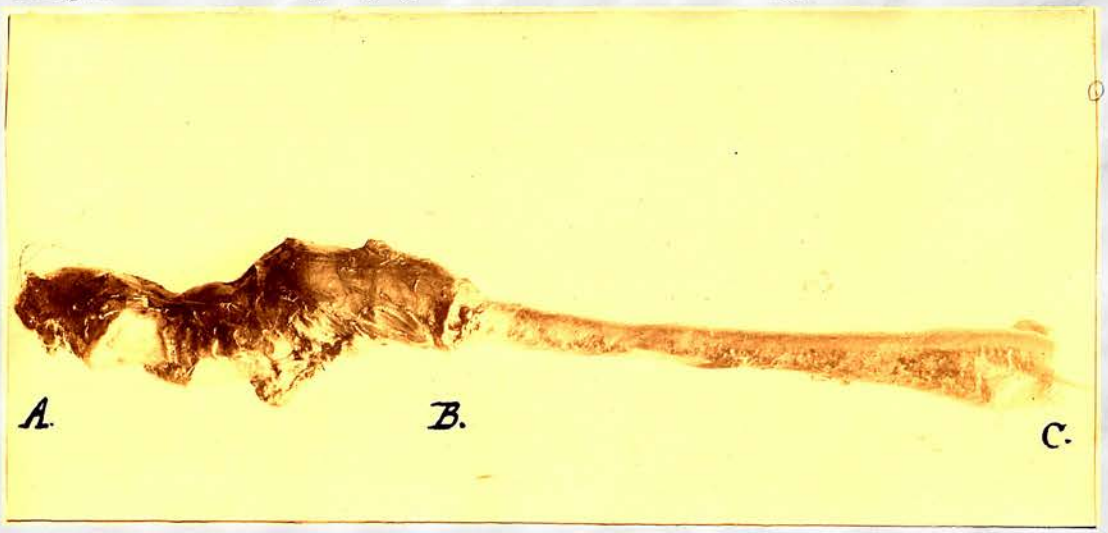
The position of the appendix may be explained in two ways. There may have been a large and long retro-colic peritoneal fossa into which the appendix became herniated and fixed, the mouth of the fossa subsequently becoming closed. Or, in process of development the tip of the appendix became fixed, and, while the caecum and colon continued their descent, the appendix was left behind. The stretching caused in that way may possibly account for the great length of the appendix.

The differential diagnosis of appendicitis and acute inflammatory conditions of the gall bladder, with or without gall stones, often leads to difficulty and confusion. In this case the age of the patient and a careful enquiry into the previous history and the mode of onset and progress of the present attack determined the diagnosis of appendicular trouble. The possibility of the two conditions co-existing in the same patient should always be

remembered.

This case is also a good example of the amount of operative interference a patient can stand with impunity in an endeavour to remove a diseased appendix. In the remarks on a previous case I have referred to this subject.

The patient did very well after the operation, and he is now (six days after the operation) out of danger. The lung symptoms have also disappeared.



Photograph (natural size) of the appendix removed from Case XII.

The apical portion - A to B - is swollen, inflamed, and partly necrosed. The basal portion - B to C - is comparitively healthy.

The portion from A to B is covered by the peritoneum of the meso-colon; that from B to C is not covered by the mesentery of the meso-colon.

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I am especially indebted to the authors, too numerous to mention, who have contributed articles or have recorded cases relative to the appendix in The British Medical Journal, The Lancet, and other current medical journals.

- THE END -